HORTICULTURAL ABSTRACTS

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Initialled abstracts and reviews not by Bureau staff are by H. W. B. Barlow, F. W. M. Llewellyn, S. C. Pearce and R. S. Pitcher of the East Malling Research Station, and by G. St.C. Feilden, G. M. Roseveare and A. C. Shill.

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Total Abstracts 1,205. Noted 243.

N.B.—Numbers sub-divided alphabetically refer to items noted but not abstracted.

MISCELLANEOUS.

General.

(*See also* 3176, 3181, 3185, 3197, 3200, 3201, 3203, 3242, 3243, 3244.)

2032. STEARN, W. T., AND OTHERS.
Proposed international code of nomenclature for cultivated plants.
J. roy. hort. Soc., 1952, **77**: 157-73.

The full text is given of the codification by the editorial committee (W. H. Camp, J. S. L. Gilmour and W. T. Stearn) of the joint proposals of the International Committee on Horticultural Nomenclature and Registration and the Committee for the Nomenclature of Cultivated Plants, to be presented at the International Horticultural Congress in September 1952, in London.

2033. HUDSON, C. E.
Experimental Horticulture Stations.
J. roy. agric. Soc., 1951, **112**: 45-9.

The programme for establishing Experimental Horticulture Stations under the aegis of the N.A.A.S. is outlined. Their location has been fixed with reference to existing and projected Research Stations, the proximity of local centres of production and coverage of the main climatic regions. In addition a Fruit Variety Testing Station is proposed in the vicinity of East Malling. The investigations will be co-ordinated by the Experimental Horticultural Committee of the Agricultural Improvement Council and can be grouped under 4 headings: fruits, vegetables, glasshouse crops and protected cropping by the use of cloches, Dutch lights, etc. Advisory and demonstration work is also envisaged.

2034. WALLACE, T.
Long Ashton, University of Bristol.
Brit. agric. Bull., 1952, **4**: 254-61, bibl. 1, illus.

The Director of the Station gives a brief account of its history, development, and present organization. Research programmes are outlined for pomology, the nutrition of fruit crops, the control of pests and diseases, cider and fruit juices, domestic preservation of fruit and vegetables and the growing and utilization of basket willows.

2035. MINISTRY OF AGRICULTURE, BUENOS AIRES.
Catálogo de los planes de trabajos científicos de la Dirección General de Investigaciones Agrícolas. **(List of scientific projects being carried out by the General Department of Agricultural Investigations [Ministry of Agriculture, Buenos Aires].)**
Idia, 1951, **4**: 47: 1-68.

The numerous projects, classified according to subject, are listed under the various institutes in Argentina

at which they are being carried out. These include the Institutes of Botany, Plant Technology, Rural Engineering, Agricultural Microbiology, Plant Protection, and Soils, all in Buenos Aires, and the various regional experiment stations. The title of the project, its number and the name of the investigator working on it are given in each case.

2036. YEAGER, A. F.
Breeding improved horticultural plants. I. Vegetables. II. Fruits, nuts, and ornamentals.
Stat. Bulls N.H. agric. Exp. Stat. **380**, 1950, pp. 23, illus., and **383**, 1950, pp. 16, illus., respectively.
The aims and achievements of the New Hampshire plant breeding programme are briefly summarized in these 2 bulletins.

2037. VRIJHOF, B., KNOPPIEN, P., AND STADHOUDERS, P. J.
De tuinbouw in West-Duitsland. (**Horticulture in Western Germany.**) [English summary 1 p.]
Meded. Dir. Tuinb., 1951, **14**: 805-44, bibl. 30, illus.
This is a report by three Dutch horticulturists on observations made in Western Germany in August 1951. Research institutions mentioned are: 1. The horticultural institute at Friesdorf/Bad Godesberg. 2. The research station for viticulture, pomology, and vegetable growing at Geisenheim with its institutes for (*a*) pomology, (*b*) botany, (*c*) plant diseases, (*d*) soil science and plant nutrition, (*e*) testing and processing. 3. The institute for fruit and vegetable cultivation at Heidelberg. 4. The Limburgerhof Research Station (near Ludwigshafen) of the Bad. Anilin- und Sodafabrik (B.A.S.F.). 5. The Max Planck-Institute for breeding research at Ladenburg-Neckar. 6. The College of Horticulture and Agriculture at Hannover. 7. The Pomology Research Station at Jork. 8. The institute for the study of labour and land technique at Bad Kreuznach. Agricultural and horticultural research in Germany is today decentralized. There are a few large experimental stations, financed by the Federal Republic, but many research institutions are working under the auspices of the individual State Governments, and some under private management. Much attention is being paid to the improvement of fruit varieties and rootstocks, processing of horticultural produce, manuring and overhead irrigation and social-economic research. On fertile loess soils in the Rhineland, plantations are mainly of spindle and bush trees on dwarfing stocks.

2038. VAN DEN HOEK, A. P., VAN DER HEIDE, R., AND PETTINGA, J. J.
De tuinbouw in het noorden van de Duitse Bondsrepubliek. (**Horticulture in the North of the West German Federal Republic.**) [English summary ½ p.]
Meded. Dir. Tuinbouw., 1951, **14**: 861-73.
In their report of a study-tour of Germany in 1951 the authors note that: Research on plant improvement has attained a high level in Western Germany; work on apple rootstocks is carried on at several places and reference is made to orchards with different varieties worked on rootstocks I, IV, IX and XI. The most important fruit growing region is the so-called "Alte Land" on the left bank of the Elbe, north-west of Hamburg, chiefly round Jork and Stade. Among soft fruits the strawberry predominates; many varieties are grown and new ones are constantly being tried. The market gardens and fruit farms are very well equipped and good use is made of mechanization.

2039. EGBERTS, H.
The horticultural plan of settlement.
Trans. 4th int. Congr. Soil Sci., Amsterdam 1950, Vol. II, pp. 218-19 [received 1952].
Figures are given for average yields of horticultural crops on well and poorly chosen sites to illustrate the object of the horticultural plan of settlement in Holland.

2040. VITAL RODRIGUES, R.
Aspecto actual do comércio de frutos e produtos hortícolas portugueses. (**The present state of Portuguese trade in fruit and garden produce.**) [English and French summaries 1 p.]
Bol. Junta. nac. Frutas, 1950, **10**: 711-41 [received 1952].
Statistics are given to show the present position of Portugal's fruit and vegetable trade with special reference to fresh fruits (pineapple, chestnut, melon, grapes), dried fruits (carob, almond), dehydrated fruits (dried figs), vegetables (garlic, potato, onion, French beans), canned products (olives, tomato, vegetables), condiments (red pepper).

2041. HAUSZER, K.
Neue Erfahrungen im Gartenbau. (**Modern technique in horticulture. I and II.**) [English and French summaries.]
Mitt. Klosterneuburg, 1952, **2**: 3-6, 65-8, bibl. 4.
Part I outlines the scope of a series of articles to be published and deals with modern techniques in heating and recent developments in glasshouse materials. In part II hydroponics are discussed and the use of hydropots for ornamental plants is described.

2042. CLAYPOOL, L. L., AND OTHERS.
Air transportation of fruits, vegetables and cut flowers: temperature and humidity requirements and perishable nature.
H.T. and S. Office Rep. U.S. Dep. Agric. **258**, 1951, pp. 27, bibl. 13.
General information on the handling requirements of perishables in air transit is followed by specific information on the requirements of fruits, vegetables and flowers. Tables are given showing the recommended transit temperature, permissible range of temperature for a 48 hr. period, perishability and special requirements of 22 sorts of fruit, 33 sorts of vegetable and 67 sorts of cut flowers and florists' greens.

2043. REDLICH, G. C.
Gedachten over het qualiteitsbegrip bij landen tuinbouwproducten. (**Considerations on the quality of agricultural and horticultural products.**) [English summary 2 lines.]
Landbouwk. Tijdschr., 1950, **62**: 328-32, bibl. 9 [received 1952].

The importance of the mineral composition of crops in animal and human nutrition is discussed.

Statistical design.

(*See also* 2124d, 2446.)

2044. PEARCE, S. C.
The design of calibration trials with three varieties.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 105-7, bibl. 1, illus.

Two tile designs are described for use in calibration trials on trees where 3 varieties are planted together in an orchard. In the first the tile is like this:

Z	Z	
X	Y	Direction of rows
Z	Z	⟶
Y	X	

A plantation laid out thus can be divided into plots in 3 ways. In the second design the tile is a 3×3 Latin square, which, repeated both across and downwards, results in the varieties being planted diagonally across the trial. There are 3 ways of forming plots that can be used either with or without guard rows and a fourth that can be used only with guards.

2045. PEARCE, S. C.
Studies in the measurement of apple trees. I. The use of trunk girths to estimate tree size.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 101-4, bibl. 13.

A study is made of the relationship between trunk girth and tree weight in a series of trials of bush apple trees with a view to estimating one by the other. In manurial trials, at least with varying amounts of potash, trunk girth is an adequate measure for estimation of tree weight. In trials of rootstocks and pruning treatments there is reasonable hope that further research will suggest a method of estimation, but not for trials comparing different scion varieties. [Author's summary.]

2046. RICH, S.
Using half-tree plots for increasing efficiency of fungicide tests.
From abstr. in *Phytopathology*, 1952, **42**: 114.

Different treatments were applied to the east and west halves of the same McIntosh apple trees. An analysis of variance segregated the block error, and showed no significant east-west effect. Other regression studies showed that the amount of disease in poor treatments was directly affected by the amount of disease in the opposite half-tree, but good treatments were not affected in this way.

2047. FRITH, H. J.
A factorial field experiment with citrus, Farm 466. No. 1: Introduction.
Internal Rep. Irrig. Res. Stat. Griffith **8**, 1949, pp. 16 [received 1951].

The experiment was designed in 4×4 plaid squares with four irrigation methods applied to the columns, four cultural methods applied to the rows and four levels of sulphate of ammonia applied to the plots with four rootstock-scion combinations forming one-tree sub-plots. The trial was planted in September 1941 and the cultural treatments (summer clean cultivation, farmyard manure, weeds mown and oil spray) were added in the first half of 1947. The irrigation treatments (heavy irrigation, light irrigation, irrigation in alternate bays and irrigation with tile drains) started at the end of 1947, as did two of the levels of nitrogen, these being increased to four levels two years later.

S.C.P.

2048. SHARPE, R. H., AND GAMMON, N., JR.
Sources of error in foliar analysis of pecans.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 120-4, bibl. 8, being *J. Ser. Fla agric. Exp. Stat.* **6**.

Analysis of pecan foliage from 2 varieties in 2 orchards showed that highly significant differences in Ca, K, Mg and P existed between individual trees in a uniformly treated block. Variety, orchard and tree variations were high compared with errors of chemical analysis. The sample size of 40 leaflets per tree gave a low error compared with that of chemical analysis. Data on the source of analytical errors are given, with suggestions for their reduction in magnitude.

2049. CHINLOY, T., AND INNES, R. F.
Some designs used in sugar-cane experimentation in Jamaica, their analyses and interpretation of results.
Proc. 1950 Mtg B.W.I. Sugar Tech., 1950, pp. 58-72, bibl. 4.

All but one of the designs are of the 3^n type with confounding and, in one case, partial replication. The other is a $4 \times 3 \times 2$ factorial design in blocks of twelve plots. These designs are considered to have been successful and a long discussion is reported. S.C.P.

Meteorology.

(*See also* 2123k, 2302.)

2050. UEHARA, M.
On the micrometeorology at the slope farm (first report).
Micrometeorological study in summer at the north-sloping vine-garden.
On the micrometeorology at the slope farm (second report).
On the micrometeorology at the slope farm III.
Studies on the cultivation and utilization of slope farm. V. Micrometeorological study in autumn on the slope farm.
Studies on the cultivation and utilization of slope farm. VI. Micrometeorological study in winter on the slope farm. [All in Japanese with English summaries.]
Tech. Bull. Kagawa agric. Coll., 1949, **1**: 1: 46-57, bibl. 14; **1**: 2: 27-38, bibl. 10, illus.; 1950, **1**: 3: 1-13, bibl. 6, illus.; 1950, **2**: 31-8, bibl. 8; 1951, **2**: 178-85, bibl. 2; 1951, **3**: 1-10, bibl. 2.

These papers describe records kept on both northerly and southerly slopes of air and ground temperatures, humidity and evaporation and wind. In the second, comparisons are made between an open area and an area planted in trellised vines. In the third, comparisons are made between the temperatures of trunks of persimmon trees in the upper and lower parts of an orchard and between different sides of the tree,

and also between whitewashed and untreated trunks of orange trees. The fourth paper includes details of temperature, humidity and wind changes at different heights in a persimmon and an orange orchard. The fifth and sixth papers present data on temperatures and solar radiation in the same orchards during autumn and winter.

2051. PRESTON, A. P.
Wind records in some Kent orchards.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 93-6, bibl. 1.

Cup counter anemometers, recording the run of wind, were erected in six Kent orchards situated at different altitudes and of varying topography. A method of calibrating the machines in the field is outlined and wind data from orchard sites are shown for five apple blossom seasons. The higher sites recorded higher values for run of wind which varied seasonally and according to the height of anemometer. Data from anemometers at 25½ feet and 4½ feet above ground suggest that tall masts are unnecessary in establishing site differences for run of the wind in young orchards. The limitation of cup counter anemometers of the type used is stressed in relation to future work on wind susceptibility of orchard sites. [Author's summary.]

2052. SANTOMAURO, L.
La pioggia artificiale. (**Production of rain by human agency.**)
Ital. agric., 1951, **88**: 392-402.

In this paper the meteorological astronomer of Brera describes in some detail the studies that have been made in recent years in France, England, Australia, Canada and the U.S.A. to determine the best means of inducing clouds to release their moisture when required. Dry ice and silver iodide have effected some remarkable releases, but the exact regulation of the effects of such substances still remains unachieved, so that no approach to exploiting such procedure economically has yet been made. The Cloud Physics Project now exists in the U.S.A., its long term object being a scientific study of the behaviour of different chemical agents in provoking artificial rain. A few details are given of a successful experiment in New Mexico in which Langmuir, one of the leading workers on the subject, was concerned.

Biochemistry.

(*See also* 2712, 3069.)

2053. VANSTONE, F. H.
A quantitative method of flame spectrographic analysis.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 122-5, bibl. 2.

A quantitative modification of a previously described flame method of spectrography [see *H.A.*, 20: 2265] is described. 50 mg. or less of the plant material is ashed and mixed with an internal standard powder before burning as in the previous method. There is serious suppression of the lines of certain elements by the presence of other elements. This is compensated for by choosing as internal standard an element that is affected in the same way as the element to be determined. The method had so far been applied to potassium, calcium, magnesium, iron, manganese and copper. [Author's summary.]

2054. YOUNG, R. E., PRATT, H. K., AND BIALE, J. B.
Manometric determination of low concentrations of ethylene with particular reference to plant material.
Analyt. Chem., 1952, **24**: 551-5, bibl. 20, illus.

The sensitive, quantitative, analytical method described was developed with particular reference to the study of fruit ripening.—Univ. Calif., Los Angeles and Davis.

2055. MASON, A. C.
A sensitive method for the determination of magnesium using Titan Yellow.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 126-7, bibl. 2.

An improved method is described for estimating small quantities of magnesium by Titan Yellow. The method, which makes use of polyvinyl alcohol and concentrated alkali, is based on that described by Young and Gill [see *H.A.*, 21: 3158]. [Author's summary.]

2056. WAGHORNE, D., AND BALL, C. D.
Semimicromethod for the determination of plant sterols.
Analyt. Chem., 1952, **24**: 560-4, bibl. 23.

" This work was undertaken to find a semimicromethod for the estimation of plant sterols, so that the development of these sterols during the life of a plant could be studied."—Ontario Agricultural College and Michigan State College.

2057. WOOD, R. K. S., GOLD, A. H., AND RAWLINS, T. E.
Electron microscopy of primary cell walls treated with pectic enzymes.
Amer. J. Bot., 1952, **39**: 132-3, bibl. 6, illus.

A technique is described for removing the pectic constituents of cell walls with pectic enzymes from *Bacterium aroideae* prior to electron microscopy of the walls. Mention is made of its use on tissues of some horticultural plants. The advantages of the enzyme technique are the mildness of the treatment to which the material is subjected and the ease with which suspensions of intact cells are obtained.

2058. MITSUDA, H.
Studies on vitamin C.
Mem. Coll. Agric. Kyoto Univ. **57** (*chem. Ser.* **24**), 1950, Art. 1, pp. 1-11, bibl. 9.

Several studies are described briefly. The vitamin C content of the flowers and leaves of a number of plants, mostly ornamentals, proved to be much higher than that of orange juice. With pears, persimmons and orange fruits the vitamin C content was proportional to the amount of sunlight received during ripening. Two grades of green teas contained much more vitamin C than a third grade of green tea or a black tea, owing to differences in exposure to sun in the one case and to method of manufacture in the other. Vitamin C proved very subject to oxidation, but was preserved by heating, which readily destroyed ascorbic acid oxidase. In the manufacture of black tea the

oxidase was not inactivated. From a study of the interrelationship between chlorophyll, catalase activity and vitamin C it is concluded that the vitamin plays an important role in photosynthesis.

2059. HALL, W. C.
Studies on the origin of ethylene from plant tissues.
Bot. Gaz., 1951, **113**: 55-65, bibl. 19.
A relatively rapid, quantitative method for estimating the production of ethylene from plant tissues is reported. Results obtained by this method showed that intact Valencia oranges produced considerably less ethylene than fruit that was cut into segments or inoculated with *Penicillium digitatum*. Leaves of rose and cotton produced measurable amounts of ethylene, young cotton leaves evolving relatively more than mature cotton leaves. *In vitro* studies revealed that ethylene arises by enzymatic degradation of a number of active substrates during respiration. A suggestion is made concerning its mode of origin in living tissue.—Agricultural and Mechnical College of Texas.

2060. HEWITT, E. J., AND AGARWALA, S. C.
Reduction of triphenyltetrazolium chloride by plant tissues and its relation to molybdenum status.
Nature, 1952, **169**: 545-6, bibl. 14.
During an examination of the factors influencing the reduction of triphenyltetrazolium chloride to the insoluble red formozan pigment in various plant tissues it was found that tissues of plants grown without molybdenum possessed only weak reducing activity compared with normal material. This was repeatedly observed in cauliflower and tomato petioles and was confirmed in swede, kale, lucerne, clovers, beans and potatoes. The possible reasons for this phenomenon are discussed.—Long Ashton Res. Stat.

2061. LEE, A. E.
Nitrogen and amino acids in normal, habituated, and bacteria-free crown gall tumor tissue cultures of grape.
Plant Physiol., 1952, **27**: 173-8, bibl. 16.
Differences observed by other workers in the ability of normal, habituated, and bacteria-free crown gall tissues to synthesize growth substances point to differences in fundamental protoplasmic synthesis. Analyses were therefore made of total nitrogen, soluble nitrogen and total phosphorus, and estimations made of total crude protein in such tissues from grape vine. The crown gall tissue had the highest percentage total nitrogen and estimated crude protein, with habituated tissue next, and normal tissue least in these determinations. The percentage soluble nitrogen followed the same pattern but did not differ so greatly. The percentage total phosphorus was highest for the crown gall tissue and about the same for the normal and habituated tissues. In percentage dry weight the habituated tissues were highest, with the normal next, and crown gall least in this comparison. A suggestion is made that the metabolic differences may involve factors related to the proportions of protein synthesis to structural carbohydrate synthesis. The amino acids of the three tissue types are essentially similar.—University of Texas, Austin.

Physiology.

(*See also* 2123t, 2713, 3180.)

2062. GEORLETTE, R.
La parthénocarpie naturelle et artificielle chez les plantes à fruits comestibles. (**Natural and induced parthenocarpy in plants with edible fruits.**)
Ann. Gembl., 1952, **58**: 36-79, bibl. 375.
A comprehensive review of the literature on parthenocarpy in solanaceous plants, cucurbits, and deciduous, sub-tropical and tropical fruits, each species being dealt with separately. The bibliography is also arranged according to plant species.

2063. ALVIM, P. DE T.
The influence of the green mesophyll in stomatal movement.
Plant Physiol., 1952, **27**: 206-9, bibl. 9.
The results of experiments at the Interamerican Institute of Agricultural Sciences, Turrialba, with geranium leaves show that, in the case of mature leaves, the green mesophyll does not play any important part in the mechanism of the reaction of stomata to light. In the case of young leaves the presence of chlorophyll in the mesophyll affected the time required to initiate the opening movement of the stomata but not, apparently, the degree of opening.

2064. ALVIM, P. DE T.
A atividade fotosintética das celulas guardas. (**The photosynthetic activity of guard cells.**) [English abstract ½ p.]
Lilloa, 1949, **19**: 5-10, bibl. 7, illus. [received 1952].
Experiments were carried out with strips of the epidermis of *Zebrina*, *Phaseolus* and *Nicotiana* leaves to determine whether the green plastids of the guard cells were functional chloroplasts. The strips were placed in distilled water and subjected to (*a*) exposure to light in the presence of CO_2, (*b*) exposure to light in the absence of CO_2, and (*c*) darkness. After several days it was found that only the first treatment caused an increase in the size and starch content of the guard cell plastids. Treatments *b* and *c* resulted in complete disappearance of starch from the guard cells. It is concluded that guard cells are able to carry out photosynthesis, thus contributing to the change in pH which seems to be related to the mechanism of light-induced stomatal movement.

2065. BYERRUM, R. U., AND LUCAS, E. H.
Studies in plant carbonic anhydrase. II. Kinetic studies.
Plant Physiol., 1952, **27**: 111-20, bibl. 19, being *J. Art. Mich. agric. Exp. Stat.* **1211**.
A water extract of leaves of tulip and lamb's-quarters was shown to catalyse both the dehydration of carbonic acid and the hydration of CO_2 in direct proportion to the weight of leaf preparation present in the system. The evidence obtained in the experiments suggests that an enzyme, plant carbonic anhydrase, exists. A possible role for the enzyme in the initial phase of photosynthetic processes is suggested. [From authors' summary.]

2066. POHJAKALLIO, O., OLLILA, L., AND PAASI, K.
Investigations into the significance of photosynthesis in resistance to plant diseases.
Maataloust. Aikakausk., 1951, **23**: 156-63, bibl. 15.

Lack of light increased destruction by *Botrytis cinerea* in red clover and *Pythium* damping-off in radish. Light increased the resistance of red clover and radish to these diseases, apparently by accelerating photosynthesis. The resistance of red clover to *Botrytis cinerea* based on photosynthesis was probably spontaneous, and hence not due to irritation by the parasite. [Authors' conclusions.]—Helsinki Univ.

2067. ZELLER, O.
Über Assimilation und Atmung der Pflanzen im Winter bei tiefen Temperaturen. **(On photosynthesis and respiration of plants in winter at low temperatures.)**
Planta, 1951, **39**: 500-26, bibl. 33.

The investigation was carried out on winter wheat, winter barley, winter spinach, *Valerianella olitoria*, *Picea excelsa* and *Prunus laurocerasus* at the Agricultural College, Hohenheim.

2068. WOLF, J. M., BROWN, A. H., AND GODDARD, D. R.
An improved electrical conductivity method for accurately following changes in the respiratory quotient of a single biological sample.
Plant Physiol., 1952, **27**: 70-80, bibl. 18, illus.

A method is described for following changes in respiratory quotient on a single biological sample. Oxygen is measured manometrically, and CO_2 is determined by an improved electrical conductivity method employing electrodes built into the alkali inset of a respirometer vessel in such a fashion as to allow continuous readings of CO_2 production. The electrical circuit is presented, and calibration data are provided from which one may calculate from resistance readings the volume of CO_2 absorbed by a measured volume of 0·05 *N* NaOH in the inset at any temperature between 7½° C. and 40° C. Measurements on yeast are furnished to illustrate the use of the method. [Authors' summary.]—University of Rochester, N.Y.

2069. SWINGLE, C. F.
Regeneration and vegetative propagation. II.
Bot. Rev., 1952, **18**: 1-13, bibl. 107.

The author considers the work that has been done on regeneration since the appearance of his first review of the subject in 1940 [see *H.A.*, 10: 1297]. He points out that although remarkable strides have been made in the use of growth substances and an immense amount of data has been accumulated on the practical aspects of propagation, anatomical and morphological studies have not kept pace and we still have very little basic knowledge on protoplasm and its role in plant regeneration.

Polyploidy.

2070. SCHWANITZ, F.
Untersuchungen an polyploiden Pflanzen. XII. Der Gigas-Charakter der Kulturpflanzen und seine Bedeutung für die Polyploidiezüchtung. **(Investigations on polyploid plants. XII. The gigas character of cultivated plants and its significance in breeding polyploids.)**
Züchter, 1951, **21**: 65-75, bibl. 39, illus.

A comparative study of the size of the cell in many cultivated plants, including numerous vegetables, strawberry, and kok-saghyz, and their wild forms showed the diploid cultivated crops to be gigas forms with, in many cases, greatly enlarged cells. The gigas growth typical of cultivated plants may be due to mutation or combination of genes or possibly even to effects originating in the plasmon. It is assumed that for each species there is an optimum cell size which will produce the performance expected of a cultivated plant. If this optimum is exceeded vitality, assimilation and fertility decrease. The diploid cultivated plants have in most cases attained their optimum cell size, so that on polyploidization their performance must suffer. The high quality and vitality of the old polyploid cultivated plants are considered to be due to these forms having developed from primitive cultivated forms or wild species with small cells.

Growth substances.

(*See also* 2089, 2093, 2123a, n, w, x, y, 2195-2210, 2260, 2403, Weeds and weed control section, 2628, 2652-2655, 2664, 2677, 2763, 2765, 2783, 2900, 2901, 2925, 2959, 2960, 3043, 3079, 3126, 3190, 3211.)

2071. LUCKWILL, L. C.
Application of paper chromatography to the separation and identification of auxins and growth-inhibitors.
Nature, 1952, **169**: 375, bibl. 1.

At the Long Ashton Research Station growth-promoting and growth-inhibiting substances were separated and identified by paper chromatography, used in conjunction with biological tests. A preliminary survey of some plant tissues using this technique has revealed the presence of two distinct auxins. One of these has an R_F value of 0·35, identical with that of indolylacetic acid. The other has an R_F of approximately 0·83 and possesses many of the properties described for the hormone which is produced in apple seeds [see *H.A.* 21: 3278]. In addition to one or other of these two auxins, all the plant extracts contained a growth-inhibitor with an R_F value of 0·66.

2072. MINARIK, C. E., AND OTHERS.
New growth-regulating compounds. II. Substituted benzoic acids.
Bot. Gaz., 1951, **113**: 135-47, bibl. 8, illus.

More than 200 substituted benzoic acids were tested for inhibitory activity, but only seven can be classified as highly active. Nonhalogen as well as halogen ring substituents confer activity on the molecule, and active compounds contain substituents in practically all position combinations. Responses induced in red kidney bean plants by these compounds are similar in many respects to those induced by phenoxy derivatives and comprise curvature, leaf modification, galls, witches'-broom, and root-tip swellings. The responses appear to be of longer duration than those induced by phenoxy compounds. It has been suggested that the substituted benzoic acids remain mobile within the plant and continue to migrate to the newly-developing leaves at the stem apex. The 3-nitro-4-halogen benzoic acids are strong stimulators and can prevent 2,4-D from inhibiting the elongation of intact cucumber roots. [From authors' summary.]—Camp Detrick, Frederick, Md.

2073. READY, D., AND OTHERS.
Albinism induced by substituted benzoic acids.
Plant Physiol., 1952, **27**: 210-11, bibl. 1, illus.

Certain substituted benzoic acids, when applied to the soil in which oat seedlings were growing, induced albinism in the leaves which appeared 3 days after treatment. Generally only 2 leaves were affected and normal colour was restored in about 2 weeks. Mature tissues were not affected, which suggests that the mechanism of action may be inhibition of pigment formation. It was found that the meta nitro grouping and the para oxygen-containing substituent are necessary to induce the response.—Biol. Labs, Camp Detrick, Md.

2074. DAY, B. E.
The absorption and translocation of 2,4-dichlorophenoxyacetic acid by bean plants.
Plant Physiol., 1952, **27**: 143-52, bibl. 6.

When a small quantity of 2,4-D was applied to one leaf of a bean seedling under greenhouse conditions, curvature began in approximately two hours, and reached a maximum in about six hours, at which time recovery began. The time from application of 2,4-D to the beginning of curvature was independent of the amount of 2,4-D applied. The maximum curvature attained was a measure of the amount of 2,4-D absorbed and translocated, and the rate of bending, once it began, was likewise determined by the dose. It was found that the 2,4-D moved through the cuticle, epidermis, and mesophyll to the phloem with a velocity of approximately 30μ per hour. Once inside the phloem it was translocated the several centimeters to the epicotyl at a velocity varying through a range of 10 to 100 cm. per hour. After the 2,4-D reached the epicotyl, about 40 minutes elapsed before curvature began, and when the supply of 2,4-D to the epicotyl was interrupted, an hour elapsed before recovery began. Under the conditions of these tests, the maximum amount of 2,4-D was absorbed by leaves in the first four and a half hours after treatment. [From author's summary.]

2075. SÍVORI, E. M.
Traslado del acido 2-4-diclorofenoxiacético en *Vicia faba*. **(Translocation of 2,4-D in *Vicia faba*.)** [German summary ⅓ p.]
Lilloa, 1949, **19**: 43-8, bibl. 5, illus. [received 1952].

From experiments described it is concluded that 2,4-D is translocated in the plant in close association with the carbohydrates. Translocation occurs not only from leaf to stem but from one stem to another in the same plant. If the treated part is kept in the dark for 72 hrs. before treatment and 48 hrs. after treatment, and is then cut off, no symptoms of 2,4-D activity appear in the remaining portions of the plant, indicating that there has been no translocation.

2076. STAPP, C., AND FRETER, R.
Untersuchungen über die Wirkung von 2,4-D im Boden. I. Mitteilung: Eine verbesserte Nachweismethode und orientierende Versuche über die Haltbarkeitsdauer des Wuchsstoffs in Boden. **(The action of 2,4-D in the soil. I. An improved indicator method and an investigation on persistence of the growth substance in the soil.)**
Phytopath. Z., 1952, **18**: 365-75, bibl. 13.

The biological method of determining 2,4-D, as described in American and English articles, was tested and found to be unreliable for exact investigations. Measurements of the growth of the primary root of pea seedlings was found to be a better method. The numerous American and English findings on the persistence of 2,4-D in various soils were confirmed.

2077. FLIEG, O., AND PFAFF, C.
Über Wanderung und Abbau der 2,4 D im Boden sowie ihren Einfluss auf mikrobiologische Umsetzungen. **(The movement and disintegration of 2,4 D in the soil and its influence on microbiological decomposition.)**
Landw. Forschung, 1951, **3**: 113-23.

It was established that 2,4-D does not penetrate lower than 5 cm. below the soil surface. In healthy soils, under favourable moisture and temperature conditions for microbiological activity, 2,4-D applied at normal rates was completely inactivated within 6 weeks, as measured by the germination response of *Sinapis alba*. In acid forest soil the process was considerably slower, and in sterilized soil 2,4-D did not disintegrate at all, suggesting that the inactivation is due to microbiological activity. To ascertain the influence of 2,4-D on the soil microflora, it was found that, while in a nutrient solution 1 kg. per ha. application affected nitrification, in soil the same amount appeared ineffective, and only very high rates, i.e. 100 and 1,000 kg. per ha., caused depressions in transpiration and nitrification.—Bad. Anilin-u. Sodafab.

2078. JONES, E. R. H., AND OTHERS.
3-indolylacetonitrile: a naturally occurring plant growth hormone.
Nature, 1952, **169**: 485-7, bibl. 21.

The neutral indole-derivative 3-indolylacetonitrile, obtained from cabbage and other cruciferous plants was found to be a more active plant hormone than 3-indoleacetic acid; a 0·1 mgm./l. solution of the nitrile having approximately the same activity as a 1·0 mgm./l. solution of the acid. Experiments with the hormone at Manchester University are described and its probable origin in the plant is discussed. Fuller accounts of the work are to be published.

2079. GORTNER, W. A.
Water of crystallization in the plant-growth regulator α-naphthaleneacetic acid and its salts.
Science, 1952, **115**: 122-3, bibl. 2, being *Tech. Pap. Pineapple Res. Inst. Hawaii* **193.**

Under Honolulu conditions it has been found that sodium *a*-naphthaleneacetate kept at a humidity range of 35 to 90% appears to have 4 molecules of water of crystallization, and that it loses these as the humidity drops from 35 to 25%. This may introduce an error of over 25% in biological tests. The potassium salt has 1 molecule of water of crystallization under Honolulu conditions.

2080. SIRONVAL, C.
La localisation des radicaux donnant la réaction dite " chromaffine " pendant les premiers stades du développement du fraisier des quatre-saisons. **(The localization of radicals giving the chromaffin reaction during the early stages of development of the everbearing strawberry.)**
C.R. Rech. I.R.S.I.A. No. 6: Trav. Centre Rech. Hormones vég. (1949-50), 1952, pp. 115-19, bibl. 3.

The position and concentration of substances giving the chromaffin reaction, notably substances with ortho-diphenol radicals, were determined in everbearing strawberry seedlings in relation to the development of roots and leaves. It was found that wherever a root meristem was active the chromaffin reaction was very intense. The chromaffin reactive substances disappeared from the cotyledons during the growth of the primary radicle. With the appearance of the first leaf more reactive material appeared and this was followed by the appearance of secondary root meristems. The appearance of the second and third leaves caused an accumulation of reactive material at the cotyledonary node which was followed by the emergence of the first cotyledonary root. These facts support the hypothesis that substances giving the reaction play an important part in root formation, and that they are formed in the leaves.

2081. Bouillenne, R., and Bouillenne-Walrand, M.
Recherches sur la rhizogenèse. Transport non polaire de la rhizocaline dans les épicotyles de *Impatiens balsamina* L. et de *Phaseolus vulgaris* L. **(Experiments on root formation. Non-polar transport of rhizocaline in the epicotyls of *Impatiens balsamina* and *Phaseolus vulgaris*.)**
C.R. Rech. I.R.S.I.A. No. 6: Trav. Centre Rech. Hormones vég. (*1949-50*), 1952, pp. 95-111, bibl. 4.

Isolated epicotyls of *Impatiens* and *Phaseolus*, raised in darkness either on a complete nutrient medium or on sugar solution alone, were capable of producing roots if, before isolation, they had been grown on plants with 1 or 2 cotyledons. If grown on plants from which the cotyledons had been removed, no roots were formed. This indicates that the root-inducing substance is transported in a non-polar direction from the cotyledons to the epicotyl.

2082. Noel, R.
Influence de la température et de la qualité de la lumière sur la rhizogenèse chez les plantules de *Impatiens balsamina* L. **(The influence of temperature and of quality of light on root formation in *Impatiens balsamina* seedlings.)**
C.R. Rech. I.R.S.I.A. No. 6: Trav. Centre Rech. Hormones vég. (*1949-50*), 1952, pp. 112-14, bibl. 2.

Excised hypocotyls of *Impatiens*, raised in the dark, were cultured, still in the dark, on nutrient media at 15, 23, and 26° C. Root formation was practically inhibited at 15° C., while twice the number of roots were formed at 26° C. as at 23° C. Cuttings of *Impatiens*, consisting of 60 mm. hypocotyl and 4 true leaves each, were placed in water under (*a*) natural light, (*b*) yellow light, and (*c*) blue light, at 25° C. After 6 days only 1 root was formed on the hypocotyls of the plant under blue light, while those under yellow and natural light had an average of 9 and 17 roots each respectively. These results show the effect of quality of light on the synthesis of the root-inducing substances.

Radioactive materials.

(*See also* 2123h, 2439, 2468, 2707, 2777, 3091.)

2083. Bourne, G. H.
Autoradiography.
Biol. Rev., 1952, **27**: 108-31, bibl. 103.

An account is given of the theory and practice of autoradiography, " a method whereby specific chemical substances are made to demonstrate their localization in organs and tissues by a natural or induced radioactivity ". Work on the application of autoradiographs to biological problems is reviewed. The investigations have mainly been concerned with animal tissue but mention is made of the incorporation of radio-phosphorus, radio-sulphur and radio-zinc in plant tissue.

2084. Björling, K., Lihnell, D., and Ossiannilsson, F.
Marking viruliferous aphids with radioactive phosphorus.
Acta Agric. Scand., 1951, **1**: 301-17, illus.

These investigations were started in 1949 and repeated in 1950. In preliminary experiments in the laboratory it was shown that aphids (*Myzus persicae* Sulz. and *Aphis fabae* Scop.) became radioactive when living on broad bean plants watered with radioactive sodium orthophosphate. The aphids retained their radioactivity for at least 2 or 3 weeks after removal to non-radioactive plants. The radioactivity was " inherited " by the offspring of the aphids for at least two generations. The chief experiments, which were carried out on sugar beets in the field, were arranged in such a way that the distribution of aphids (*Myzus persicae* and *Aphis fabae*) from a radioactive centre to the surrounding plants in the plot and the spread of yellow virus from the same centre could be studied. Obviously this method of tracing the movements of the aphids has many difficulties and its limitations are evident. Nevertheless it might be useful, if the experiments were made on a sufficiently large scale. [From authors' summary.]—Swedish Plant Protection Institute, Stockholm, and Royal Agricultural College, Uppsala.

2085. Holley, R. W.
Studies of the fate of radioactive 2,4-dichlorophenoxyacetic acid in bean plants. II. A water-soluble transformation product of 2,4-D.
Arch. Biochem. Biophys., 1952, **35**: 171-5, bibl. 10, being *J. Pap. N.Y. St. agric. Exp. Stat.* **869.**

The water-soluble radioactive material which represents about 60% of the radioactivity present in red kidney bean plants 1 week after treatment with carboxyl-labelled 2,4-D has been investigated. It has been found to be present in plants as early as 6 hr. after treatment, at the time of the first visible effects of 2,4-D. It is dialysable. It is hydrolysed by acid or by alkali to an ether-extractable organic acid. This radioactive acid is not 2,4-D. [From author's summary.]

Seeds and seed treatment.

(*See also* 2123i, 2582, 2583, 2586, 2587, 2682y, 3170q.)

2086. Seed World Publications.
Seed trade buyers' guide, 1952.
Seed World Publications, 327 So. La Salle St., Chicago 4, Illinois, 1952, Vol. **35**, pp. 276.

The American seed trade will find this annual publication a source of much valuable information. It contains, among other things, analyses of seed acreages harvested and of imports, exports and prices of seed, summaries of the seed laws of the various states of America, descriptions of common and noxious weeds, information on where, in America, to obtain sprays, dusts and other equipment, lists of seed growers and American and foreign seed houses, tables of germination standards and a register of American trade names.

2087. BERTRAND, G., AND BERTRAND, D.
Sur la teneur des graines en rubidium. **(The rubidium content of seeds.)**
C.R. Acad. Agric. Fr., 1952, **38**: 66-8, bibl. 1.

Continuing their work on the rubidium content of seeds [*H.A.*, 22: 58] the authors present another list of seeds from 43 species of cultivated and wild plants. With reference to plant families they find the average rubidium content of seeds (mg./kg. of the dry material) to be for Cruciferae 11·50, Papilionaceae 10·00, Labiatae 6·67, Gramineae 5·75, other families 11·17.

2088. SASS, J. E.
Response of meristems of seedlings to benzene hexachloride used as a seed protectant.
Science, 1951, **114**: 466, bibl. 5, illus., being *J. Pap. Ia agric. Exp. Stat.* **J-1956.**

Cytological examinations of root meristems of maize, garden peas and soya beans have shown that heavy dosages of BHC used as a seed protectant prevent normal chromosome separation. Cell division is inhibited but considerable cell enlargement occurs. Elongation of the radicle and plumule eventually stops and the organs become greatly thickened. Finally tissue breakdown occurs and the seedling dies.

2089. ALLEN, S. E., AND SKOOG, F.
Stimulation of seedling growth by seed treatments with N-phenyl succinimide derivatives.
Plant Physiol., 1952, **27**: 179-83, bibl. 3.

Certain aromatic derivatives of succinimide stimulated growth of wheat and radish seedlings, particularly of roots, in four-day germination tests. Aqueous solutions of N-2,4-dichlorophenyl succinimide in concentrations from 10 to 50 p.p.m. as compared with water controls consistently increased the root length by 30 to 75%. N-phenyl succinimide and other chlorinated derivatives were slightly less effective. Low concentrations of N-nitrophenyl succinimides were also active but concentrations above 50 mg./l. tended to be toxic. The effect was obtained both in the presence and absence of mineral nutrients. No reproducible stimulation of growth in older plants was obtained either by seed treatments or subsequent applications of the chemicals to shoots or roots. [From authors' summary].—University of Wisconsin, Madison.

2090. HAGEL, G.
Über die Wirkung von Digitalis und anderen Glykosiden auf die Keimung und das Wachstum von Pflanzen. **(On the effect of digitalis and other glucosides on the germination and growth of plants.)**
Züchter, 1951, **21**: 138-42, bibl. 8.

In disagreement with earlier claims, the author found that digitalis and other glucosides used in heart therapy did not cause swelling of seeds resulting in improved germination and growth and higher yields. The test plants used in these trials included cucumber, lettuce, and peas.

2091. GADD, I.
Biochemical tests for seed germination.
Proc. int. Seed Testing Ass., 1951, **16**: 235-53, bibl. 5.

None of the 8 methods discussed is likely for the time being to replace our present routine seed testing practice which is based on the concept of germinating capacity. The biochemical test, however, "could serve as a complementary method in cases where we want to get more reliable information about the general vitality and resistance power of a seed lot against infectious fungous diseases in the soil as illustrated by the malachite tests with peas. Finally, it might be applicable in the case of very slowly germinating forest and fruit tree seeds, where the ordinary germination test is unsatisfactory."

2092. WRIGHT, W. H.
Standardized tests.
Proc. int. Seed Testing Ass., 1951, **16**: 152-5.

A brief account of the work done by the Committee on Standardized Tests which is composed of members delegated by the Association of Official Seed Analysts and the U.S. and Canadian Departments of Agriculture.

2093. MITCHELL, J. W.
Effect of growth regulating substances on seeds.
Proc. int. Seed Testing Ass., 1951, **16**: 183-9, bibl. 25.

The author concludes his review: "We are aware of the danger of injuring seeds of crop plants through careless use of some of the more potent growth chemicals. Recently we have found that it is possible to use chemicals for stimulating the development of some kinds of seeds, and thus hasten their growth and make them mature earlier than usual. In the future we may, through the use of growth regulating substances, be able to alter to some extent the chemical composition of some kinds of seeds so as to make them better meet our needs as a source of food."

Soil management and irrigation.

(*See also* 2682u, 3213.)

2094. MULDER, E. G.
Effect of liming of an acid peat soil on microbial activity.
Trans. 4th int. Congr. Soil Sci., Amsterdam 1950, Vol. II, pp. 117-21 [received 1952].

$CaCO_3$ was applied to a lowmoor peat of pH 4·2 at rates varying from 2 to 60 t. per ha at Groningen, Holland, potatoes and rye being cropped. Considerable increases in the uptake of nitrogen were recorded and counts indicated a much larger increase in the population of actinomycetes than of bacteria. This increase in the development of actinomyces after liming was reflected in an increase of potato scab. Azotobacter, originally absent, was not introduced during the first few years after liming, but appeared ultimately.

2095. Westerhof, J. J.
Restoration of the structure of inundated areas in the Netherlands.
Trans. 4th int. Congr. Soil Sci., Amsterdam 1950, Vol. I, pp. 415-18 [received 1952].
The relationship between soil composition and quantity of gypsum required to restore structure after inundation was studied by means of yield records of potatoes, onions, poppies and other crops in S.-W. Holland.

2096. Taylor, J. K.
The classification of irrigation soils with reference to land use.
Trans. 4th int. Congr. Soil Sci., Amsterdam 1950, Vol. II, pp. 228-30, bibl. 1 [received 1952].
South-east Australian soils are classified according to suitability for various categories of cropping, the horticultural brown solonised soils of the Murray Valley being evaluated in 8 sections, viz. those for citrus, apricots, peaches, prunes, stone fruits, vines and fodder crops.

2097. Brown, L. N.
Irrigation methods to conserve soil and water on steep lands.
Circ. Calif. agric. Ext. Serv. **177**, 1951, pp. 19, illus.
This popular, well illustrated article includes some useful hints on the irrigation of orchards situated on slopes to ensure that the soil is adequately wetted and at the same time erosion is prevented. The methods described briefly include contour irrigation, down-hill furrow irrigation combined with cover cropping, simple devices to regulate flow, the use of portable flumes, zigzag furrow irrigation, sprinkler irrigation and methods used for irrigating young fruit trees.

2098. de Charnacé, R.
L'irrigation par aspersion. Matériel d'arrosage. **(Sprinkler irrigation. Equipment.)**
Fruits d'Outre Mer, 1951, **6**: 428-34, bibl. 11, illus.
The various types of sprinkler produced in France are described with the aid of illustrations under 4 headings: Sprinklers turning on a vertical axis, sprinklers oscillating around a horizontal axis, sprinklers operating without rotation or oscillation, and sprinklers combining a mixture of these systems. Studies are in progress by the I.F.A.C. in Africa on the application of different methods of sprinkler irrigation to tropical crops.

2099. Blass, L.
Trickle irrigation of plants in pots.
Fruitgrower, 1952, No. 2931, p. 390, illus.
Methods are briefly outlined of the use, advantages and cost of trickle irrigation, which provides one slowly dripping watering point for each pot and is said to be very suitable for tomatoes and chrysanthemums.

2100. Morris, L. G.
The steam sterilizing of soil. Its physical aspects and their application.
[*Publ.*] *Brit. Soc. Res. agric. Engng.* **C.S. 14/1170,** [undated, received 1952], pp. 51, bibl. 8, illus., 4s.
Experiments were carried out to provide answers to various problems on the technique of soil sterilization, and in particular to determine the amount of steam required to heat different types of soil to 212° F., the rate of heating which results in the smallest wastage of heat, and how the pressure in the Hoddesdon pipe and the size and number of its holes influence the rate at which heating takes place. The heat capacity of compacted soil was found to vary from 24 B.T.U./ft.^{3}/°F. for dry light soil (9% moisture content) to 53 B.T.U./ft.^{3}/°F. for wet heavy soil (58% moisture content), the variation being mainly due to different moisture content. Steam flow (lb. per min.) was proportional to hole area in the pipe and square root of pressure. To avoid wasting steam it should take at least 20 min. for the surface soil to reach 212° F. If the soil is finely broken, the steam may then be turned off and the soil left covered for a further 10 min. If the soil contains clods, steaming should be continued for 10 min. at reduced pressure. With a pipe depth of 18 in. and an overall thermal efficiency of 41%, the lowest possible fuel consumptions were 24 and 27 tons/acre for light and heavy soils respectively, both in the dry state. Attention is drawn to problems that still require investigation.

2101. Clark, F. E.
The use of ethylene oxide for soil sterilization.
Trans. 4th int. Congr. Soil Sci., Amsterdam 1950, Vol. I, pp. 204-5, being *J. Pap. Ia agric. Exp. Stat.* **J-1692**, *Project* **965** [received 1952].
Experiments at the Iowa Agricultural Experiment Station have shown that sterilization with ethylene oxide not only provides a soil differing from untreated soil in having no living organisms, but also produces a marked increase in the amount of carbonaceous material readily available for microbial use.

Nutrition.

(*See also* 2123o, p, q, s, 2237b, 2282-2291, 3216.)

2102. Dozer, I., and Dole, M.
Plastics in trace element research.
Science, 1952, **115**: 93-4, bibl. 2.
Tests on several plastic jars have shown that in no case was there any contamination from Ca, Zn, Mn or Fe. It is thought that these containers should also be suitable for research on B and Mo. Plastic beads or debris may also be used to simulate soil conditions and provide support for plant root systems.

2103. Scharrer, K.
Die Bedeutung der Spurenelemente für die Pflanzenernährung und Düngung. **(The importance of trace elements for plant nutrition and fertilization.)**
Landw. Forschung, 1949, **1**: 176-84, bibl. 42 [received 1952].
A short review of the work on the influence on nutrition of [mainly] agricultural plants of the following trace elements: boron, copper, manganese, silicon, chromium, zinc, molybdenum, cobalt and vanadium.

2104. HOAGLAND, M. B.
Beryllium and growth. II. The effect of beryllium on plant growth.
Arch. Biochem. Biophys., 1952, **35**: 249-58, bibl. 22, illus., being *Publ. Cancer Comm. Harvard Univ.* **744.**

Experiments were undertaken at Harvard University to determine whether Be could replace Mg in a growing organism, tomato plants and algae being used. Within a certain range of Mg deficiency Be was found to reduce the Mg requirement of plants by some 60%, the residual obligatory Mg requirements being probably due to the needs of chlorophyll formation on which Be appears to have no effect. The pH of the nutrient solution was critical. Be was highly toxic in acid solutions, and growth increases due to Be only occurred at initial pH's above 11·2, although this rapidly fell to neutrality during the experimental period.

2105. HOAGLAND, M. B.
Beryllium and growth. III. The effect of beryllium on plant phosphatase.
Arch. Biochem. Biophys., 1952, **35**: 259-67, bibl. 12, being *Publ. Cancer Comm. Harvard Univ.* **745.**

The effect of Be and other metals on the activity of a phosphatase derived from tomato leaves was studied. Be was found to inhibit reversibly the hydrolysis of sodium adenosine triphosphate and sodium β-glycerophosphatase. The significance of this finding in relation to energy metabolism, growth and Be toxicity is discussed.

2106. MULDER, E. G.
De betekensis van molybdeen voor de plantenvoeding, in het bijzonder in verband met de stikstofbinding. **(The importance of molybdenum in plant nutrition, with special reference to nitrogen fixation.)** [English summary ½ p.]
Landbouwk. Tijdschr., 1950, **62**: 311-18, bibl. 16 [received 1952].

Experiments are described which show that molybdenum is essential to the normal development of plants, and that in the green plant (tomato) as well as in fungal and bacterial cells it acts as a catalyst in nitrate reduction. When peas were grown in culture solution lacking Mo, root nodules developed, but their N-fixing activity was markedly reduced and the plants showed severe N deficiency symptoms. In pot experiments with acid soils rich in iron oxide a clear response to Mo was shown by clovers but not by peas or beans.

2107. WARDLAW, C. W.
Experimental and analytical studies of pteridophytes. XVIII. The nutritional status of the apex and morphogenesis.
Ann. Bot. Lond., 1952, **16**: 207-18, bibl. 25, illus.

The relation between the nutrition of the shoot apex and its morphogenetic activity is discussed with special reference to the ferns. The obconical enlargement of the shoot is attended by an increase in the size of the apical and sub-apical regions; but whereas the primary morphogenetic activities of the apical region are closely comparable in small and large apices, very pronounced differences in leaf shape and size and in stelar morphology may be induced according to the nutritional status of the sub-apical regions. Large apices, which normally yield large and complex leaves and an elaborate vascular system, can, by appropriate treatments, be caused to yield " juvenile " leaves and a simple vascular system. The nutritional status of the sub-apical regions is thus seen to be of considerable interest and importance in studies of morphogenesis. A conception of the mode of distribution of nutrients in the shoot apex is described and discussed. [From author's abstract.]—Univ. Manchester.

Culture media.

(*See also* 3175, 3179, 3187.)

2108. STEINECK, O.
Nährlösungen der Pflanzenkultur. **(Nutrient solutions for plant culture.)**
Bodenkultur, 1951, **5**: 313-24, bibl. 22.

The problems discussed include optimum concentration and optimum ratio of nutrients as well as formulas for complete and deficient nutrient solutions and for solutions with increased osmotic pressure. Experiments were carried out throughout the year with horticultural and agricultural plants with the object of finding a nutrient ratio especially suited to the climate of Vienna. The solutions composed according to the author's new formulas were used in the study of nutrient deficiencies in vegetables. The review of the more recent literature is, with few exceptions, confined to papers in German.

2109. KLEIN, W. H., AND WARREN, G. F.
Iron-containing frit as a nutriculture medium.
Plant Physiol., 1952, **27**: 204-5, bibl. 1.

The value of an iron-containing glass frit as a medium for plant growth was compared with that of quartz gravel of a similar size, soya bean plants being used as the test material. At pH 5·5 the plants grew just as well in the frit without added iron as in gravel with a complete nutrient solution. At pH 7·0, when no iron was added to either, growth in the frit was much superior to growth in the gravel, plants in the gravel showing severe chlorosis and stunting. In frit without added iron at pH 7·0, growth was as good as in frit with iron. This indicates that the plants were able to obtain sufficient iron from the frit.—Purdue Univ., Lafayette, Indiana.

2110. STREET, H. E., AND MCGREGOR, S. M.
The carbohydrate nutrition of tomato roots. III. The effects of external sucrose concentration on the growth and anatomy of excised roots.
Ann. Bot. Lond., 1952, **16**: 185-205, bibl. 10, illus.

Variation of the concentration of sucrose in White's medium markedly affects the increase in length of the main axis, and the number and total length of the laterals developed by excised tomato roots. Highest values for these three features are obtained with medium containing 1·5% sucrose. Root diameter, cortical thickness, number of xylem vessels, and development of the cortical air-space system increase with increase in sucrose concentration. The degree of vacuolation of extra-stelar meristematic cells increases, and protophloem differentiates farther from the promeristem with rising sucrose concentrations. It is

suggested that this differentiation of the protophloem at greater distances from the promeristem in higher sucrose concentrations may be due to disturbance of normal nutrient gradients. The view is advanced that the sucrose concentration of the medium influences the growth and development of the root by determining the sucrose uptake. [From authors' summary.]—Univ. Manchester.

2111. ALLSOPP, A.
Experimental and analytical studies of pteridophytes XVII. The effect of various physiologically active substances on the development of *Marsilea* in sterile culture.
Ann. Bot. Lond., 1952, **16**: 165-83, bibl. 41, illus.

A technique for growing *Marsilea* aseptically is described. The effects of varying concentrations of indoleacetic acid, α-naphthalene-acetic acid, and 2,4-dichlorophenoxyacetic acid have been studied—they resemble in general those reported for other plants. Additions of adenine, guanine, or uracil have no observed effects. The effects of departures from complete nutrition and of additions of growth-promoting substances are described and discussed in relation to observed changes in leaf morphology. [Author's abstract.]—Univ. Manchester.

2112. CAPLIN, S. M., AND STEWARD, F. C.
Investigations on the growth and metabolism of plant cells. II. Variables affecting the growth of tissue explants and the development of a quantitative method using carrot root.
Ann. Bot. Lond., 1952, **16**: 219-34, bibl. 29, illus.

This paper describes the technique of growing small discs of carrot phloem in pure culture and with the precautions necessary to standardize the rate of growth at the highest practicable level. It deals with the procedure necessary to remove replicate samples of the material, with variability along the radial and longitudinal axes of the carrot, and with the regulation of the culture conditions. Evidence is adduced of the existence of a " staling factor " in crowded cultures. [Authors' abstract.]

Practical devices.

(*See also* 2041, 2068, 2213-2216, 2302, 2524, 2703, 2704, 2751, 2767b, 3129-3131.)

2113. ALVIM, P. DE T.
Um aparelho simples para registrar a transpiração das plantas. (Nota preliminar.) **(A simple apparatus for registering the transpiration of plants. Preliminary note.)** [English abstract 5 lines.]
Lilloa, 1949, **19**: 25-8, illus. [received 1952].

A simple apparatus, called a transpirograph, is described by which it is possible to obtain a continuous record of the relative intensity of the transpiration of a potted plant for several hours or several days.

2114. TALBOYS, P. W.
A method for the study of the effects of *Verticillium* toxins on the water relations of cut shoots.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 149-51, bibl. 4, illus.

An apparatus which permits the simultaneous determination of water uptake and water loss by a detached shoot is described and illustrated. In experiments in which the method was applied to hop laterals supplied with either distilled water or a culture filtrate of *Verticillium albo-atrum* it was shown that the latter treatment changed the water balance so that the loss considerably exceeded the uptake.

2115. ANON.
Het grafisch uitzetten van gegevens met behulp van een stippenapparaat. **(A graphic method of setting out data by using a point-recording apparatus.)**
Meded. Dir. Tuinb., 1952, **15**: 162-4, illus.

A description of an apparatus designed by J. Ris of the Agricultural Experiment Station and Soil Science Institute, Groningen, for recording the points on graphs.

2116. GATES, C. T.
The quantitative recovery of root systems in pot experiments.
J. Aust. Inst. agric. Sci., 1951, **17**: 152-4, illus.

A multi-compartment wooden cradle was devised for tank immersion, with a wire strengthened 2 mm. mesh copper gauze bottom and with pulley suspension with counterweight. This gives uniform treatment of root systems. Washing time is minimized (maximum 10 min. for a batch of 12), root systems are less damaged than by spraying and most finer rootlets are retained. Practical details of the operation are given. The use of compressed air through an inserted U-tube is recommended to facilitate removal of the inverted containers.
A.C.S.

2117. FIESTER, D. R.
Un propagador de alta humedad para enraizamiento de estacas. **(A high humidity propagator for rooting cuttings.)**
Turrialba, 1951, **1**: 146-9, illus.

A description and diagrammatic illustrations are given of a propagating frame in which the moisture supply is automatically regulated. The propagator has been used with success at the Interamerican Institute of Agricultural Sciences, Turrialba, for rooting coffee cuttings and could be adapted for use with other plants. Its advantages are: (*a*) the relative humidity remains constantly high, (*b*) water consumption is small, (*c*) initial outlay is low, (*d*) hand labour is reduced to a minimum, and (*e*) existing propagating frames can be readily converted to this type.

2118. BRITISH ELECTRICAL DEVELOPMENT ASSOCIATION.
Electric soil warming for the commercial grower.
[*Publ.*] *Brit. Electrical Development Ass.*, 2 Savoy Hill, London, 1951, pp. 12, illus.

Information is given on low-voltage soil warming equipment, methods of controlling the input of electricity, and the use of soil warming in hot beds, tomato beds, the propagating bench and under cloches.

2119. BRITISH ELECTRICAL DEVELOPMENT ASSOCIATION.
Electric heat in your garden.
[*Publ.*] *Brit. Electrical Development Ass.*, 2 Savoy Hill, London, 1951, pp. 25, illus.

In the first part of this pamphlet explicit directions are given to the amateur gardener on the method of installing and using electric soil warming equipment for hot beds, propagation beds and cloches, together with notes on the culture of early salad crops, tomatoes and melons in electrically warmed soil. The second part deals with the heating of greenhouses by electricity, using tubular heaters, convectors, low voltage strips and electric water-heating systems.

2120. DOEKSEN, J.
An electrical method of sampling soil for earthworms.
Trans. 4th int. Congr. Soil Sci., Amsterdam 1950, Vol. II, pp. 129-31, bibl. 1 [received 1952].

A method of estimating earthworm populations by forcing them to the surface with electric potentials is described.

2121. GRAINGER, J.
Soil injectors. Machines for the control of potato root eelworm and other soil-borne diseases by the application of volatile chemicals.
Res. Bull. W. Scot. agric. Coll., **11**, 1951, pp. 32, from abstr. in *Soils and Ferts*, 1952, **15**: 719.

Equipment for the control of soil-borne diseases and the technique of injection are described.

2122. ANON.
Multi-purpose spraying machine with wide application on the small mixed holding.
Fruitgrower, 1952, No. 2930, p. 329, illus.

The Arwell Junior Sprayer, about to be produced by the R. Wells Agricultural Group Ltd., is a new, single-wheel, power-driven machine equally suitable for work in the orchard or soft fruit plantation, in the field for rowcrop spraying or in the glasshouse. The standard machine comprises an 8 h.p. J.A.P. four-stroke engine, and a $\frac{1}{4}$ in. gear type pump with a 5 gal. tank, all mounted on a tubular steel chassis. The machine can also be powered by an electric motor and supplied with an adjustable spraybar.

Noted.

2123.

a BENNET-CLARK, T. A., TAMBIAH, M. S., AND KEFFORD, N. P.
Estimation of plant growth substances by partition chromatography.
Nature, 1952, **169**: 452-3, bibl. 5.

b BLEASDALE, J. K. A.
Atmospheric pollution and plant growth.
Nature, 1952, **169**: 376-7, bibl. 3, illus.

c CARDON, P. V.
Organization of agricultural research in the United States.
J. Sci. Food Agric., 1952, **3**: 97-104.

d CHARIÉ, M.
Formations et classifications des tourbes. Utilisation des tourbes en agriculture. **(Formation and classification of peats. Utilization of peat in agriculture.)**
Bull. Soc. centr. Hort. Dep. Seine-Infér., 1951, No. 1/2, pp. 19-23.

e CHARNEY, J., AND FISHER, W. P.
A microbiological assay method for microgram quantities of manganese in biological material.
Science, 1951, **114**: 687-8, bibl. 4.

f CHATTERJEE, D.
Plea for improvement of nomenclature of horticultural plants.
Indian J. Hort., 1951, **8**: 4: 14-16.

g CHEN, S. L.
The action spectrum for the photochemical evolution of oxygen by isolated chloroplasts.
Plant Physiol., 1952, **27**: 35-48, bibl. 18.
Chloroplasts from Swiss chard leaves were used.

h COLLIER, P. A., AND LOW, A. J.
The use of isotopes in agricultural research. I and II.
Chem. Ind. Lond., 1951, No. 51, pp. 1122-8, bibl. 21, illus.

i FRANCK, W. J.
Introductory remarks concerning a modified wording of the International Rules for Seed Testing, on the basis of experience gained after the world-war.
Proc. int. Seed Testing Ass., 1951, **16**: 405-30.

j GLERUM, J. C.
Wiedwerktuigen. **(Hoeing implements.)**
Publ. Inst. Landbouwtech. Wageningen **3**, 1950, pp. 48, from title in *Landbouwk. Tijdschr.*, 1951, **63**: 704.

k GODSKE, C. L.
Lokalmeteorologi, mikrometeorologi og vekstmeteorologi. **(Local meteorology, micrometeorology and plant meteorology.)**
Frukt og Baer, 1951, **4**: 97-100.
The application of meteorology to Norwegian horticulture.

l GREENLEAF, W. H., AND PERRY, V. G.
A weighing tripod for use in the field.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 146, illus.

m HEATH, O. V. S.
A technique for taking successive shadow graphs of the same seedlings in growth and curvature experiments with oat coleoptiles.
Ann. Bot. Lond., 1952, **16**: 251-67, bibl. 4, illus.

n HÖHN, K.
Untersuchungen über den Einfluss von Wuchs- und Hemmstoffen auf die Entwicklung der Hypokotylknospen von *Linum usitatissimum* und die Kotyledonarknospen von *Vicia faba*. **(The influence of growth promoting and growth inhibiting substances on the development of hypocotyl buds in *Linum usitatissimum* and of cotyledonary buds in *Vicia faba*.)**
Planta, 1951, **39**: 338-45, bibl. 10.

o JONES, H. T.
Magnesium as a plant nutrient.
Chem. Ind. Lond., 1951, No. 50, pp. 1108-10, bibl. 18.

p LAGERWERFF, J. V.
De bepaling van koper in grond- en gewasmonsters. **(The determination of copper in soil and plant samples.)** [English summary ⅓ p.]
Landbouwk. Tijdschr., 1950, **62**: 282-91, bibl. 45. [received 1952].
A comparison of colorimetric methods.

q LAL, K. N., AND RAO, M. S. S.
Role of manganese in crop production.
Sci. and Cult., 1951, **16**: 553-8, bibl. 30.

r LEGGATT, C. W.
International Seed Testing Association. Rules for seed testing. Proposed revision of the section dealing with sampling.
Proc. int. Seed Testing Ass., 1951, **16**: 389-404.

s MACDOUGALL, D., AND BIGGS, D. A.
Estimation of boron in plant tissue; modification of quinalizarin method.
Analyt. Chem., 1952, **24**: 566-9, bibl. 7, illus.

t SCHMITZ, J.
Über Beziehungen zwischen Blütenbildung in verschiedenen Licht-Dunkelkombinationen und Atmungsrhythmik bei wechselnden photoperiodischen Bedingungen. (Untersuchungen an *Kalanchoë blossfeldiana*). **(The relationship between flower formation in different light-dark combinations and rhythm of respiration under varying photoperiodic conditions. Investigations on *Kalanchoë blossfeldiana*.**
Planta, 1951, **39**: 271-308, bibl. 41.

u SCHRÖCK, O.
Stimulierende Wirkung des Colchicins bei der Keimung und dem Wachstum der Sämlinge. **(The stimulatory action of colchicine on the germination and growth of seedlings.)**
Züchter, 1951, **21**: 142-9, bibl. 13, illus.
Colchicine was found to stimulate stored but not freshly harvested birch seeds.

v SMITH, R. B.
The design and construction of notices for experimental plots.
Trop. Agriculture, Trin., 1951, **28**: 68-9, illus.
Metal replaces wood satisfactorily.

w VELDSTRA, H., AND VAN DE WESTERINGH, C.
Researches on plant growth regulators XIX. Structure/activity IV. Partially hydrogenated naphthoic acids and α-alkylphenylacetic acids.
VELDSTRA, H., AND VAN DE WESTERINGH, C.
Researches on plant growth regulators XX. Structure/activity V. 2-phenyl-cyclopropane-1-carboxylic acids.
VELDSTRA, H.
Researches on plant growth regulators XXI. Structure/activity VI. Halogenated benzoic acids and related compounds.
Reprinted from *Rec. Trav. chim. Pays-bas*, 1951, **70**: 1113-26, bibl. 29, illus.; **70**, 1127-35, bibl. 13, illus.; and 1952, **71**: 15-32, bibl. 26, illus. respectively.

x VELDSTRA, H., AND VAN DE WESTERINGH, C.
On the growth substance activity of substituted benzoic acids. Preliminary communication.
Reprinted from *Rec. Trav. chim. Pays-bas*, 1952, **71**: 318-20, bibl. 6.

y WAIN, R. L.
Plant growth-regulating and systemic fungicidal activity in the aryloxyalkylcarboxylic acids.
Chem. Ind. Lond., 1951, No. 8, pp. 144-5.

z WARTIOVAARA, V., AND TIKKANEN, R.
Zur Permeation des Harnstoffs in Pflanzenzellen. **(The permeation of urea in plant cells.)**
Arch. Soc. zool. bot. Fenn. "Vanamo", 1951, **6**: 19-24, bibl. 9.

2124.

a WEIER, T. E., AND STOCKING, C. R.
The chloroplast: structure, inheritance, and enzymology. II.
Bot. Rev., 1952, **18**: 14-75, bibl. 193, illus.
A review of the literature.

b WENZL, H.
Die Anwendung statistischer Prüfverfahren in Pflanzenschutzversuchen. **(The application of statistical methods to plant disease investigations.)**
Z. PflKrankh., 1952, **59**: 26-38, bibl. 23.

c WORST, J.
A micro-injection needle.
Nature, 1952, **169**: 631-2, bibl. 2, illus.

d ZOHARY, M., AND FEINBRUN, N.
Outline of vegetation of the northern Negev.
Palest. J. Bot. (J), 1951, **5**: 96-114, bibl. 13, map.

TREE FRUITS, DECIDUOUS.

General.

(*See also* 2033, 2034, 2036, 2037, 2042, 2044-2046, 2051, 2918, 3198, 3217, 3233.)

2125. NEAME, T.
Developments in fruit growing at home and abroad.*
A.R. East Malling Res. Stat. for 1951, 1952, A35, pp. 53-61.

The author, who is a prominent English fruit grower and chairman of the Executive Committee of East Malling Research Station, gives a most concise, comprehensive and yet entertaining account of developments in the practice of fruit growing in England during the last 30 years and compares the progress made with that observed abroad during a recent tour of the U.S.A. and four British Dominions.

2126. TUKER, G.
The problems and prospects of fruit-growing.
Fruitgrower, 1952, No. 2929, pp. 282-4.

Production and marketing practices of the main fruit growing countries of the world in relation to the U.K. markets are briefly outlined. It is pointed out that there is no overseas competition in soft fruits and that the acreages planted have returned to their pre-war level. Top fruit acreages, however, are still below pre-war level, and a further 20% cut in plum production for processing is recommended. Better marketing of top fruits, particularly apples, is considered desirable, and varieties suitable for commercial production are listed.

2127. KNUTH, F. M.
***Blandt frugtavlere i Sydamerika.* (Among South American fruit growers.)** [English summary 7 pp.]
Landsforen. Dansk Frugtavl, Axelborg, Copenhagen, 1950, 10×7 in., pp. 82, illus.

The author deals with apple growing and apple packing in Argentina and Chile which he visited recently.
The largest apple growing district of Argentina, the Rio Negro and Neuquen District, lying about 750 miles from Buenos Aires, is irrigated. The annual precipitation is between 5 and 10 inches. It is subject to violent storms and in summer there may be spells of hot weather with temperatures of up to 95-105° F. In spring and autumn heat during the day and frost at night are usual. The universal shelterbelts are formed of Italian poplar. Among pests the most common are red spider and codling moth, and there is some woolly aphis. Mildew occurs, but scab is unknown. Research is in progress at the Cinco Saltos Station. Thinning is done to get very large fruits and this is followed by tree bracing. All fruit is picked in 3 pickings at intervals of 10 days. The most popular apple varieties are Delicious and Red Delicious (Starking), followed by Jonathan, Blackjon and King David, Rome Beauty, Granny Smith, Black Winesap and Yellow Newtown. The containers used for the fruit are a picking box with inside dimensions 22½×14×8 in. and the international bushel box holding about 50 lb. Nearly all fruit is graded. Export fruit is carefully inspected. Pears are also an important crop. In the Mendoza province with higher rainfall irrigation is only necessary in the growing season. There grapes, olives and citrus, some plums and peaches and a few apples are grown. Hailstorms are serious. Expert estimates of Argentinian exports for 1950 were 1·8 million bushels of apples and 0·8 million bushels of pears, these coming from Rio Negro, Mendoza and the Buenos Aires district. In Chile apple production, most of it for export, amounts to ½ to ¾ million bushels and is concentrated in an area between the parallels of 35° and 38° S. Well-known American varieties are grown but there would seem to be a place for new introductions more suited to Chilean conditions. A good educative influence is spread through fruit growing circles by the Agricultural School of the North American Methodists near Angol. Pests are fairly well under control. Scab is little known, but canker is serious. The bulk of the apple export is handled by the Asociación de Productores de Peras y Manzanas de Chile ("Asproman"), a union of 70 orchards covering 20,000 acres.

* Amos Memorial Lecture.

2128. HILKENBÄUMER, F.
Die betriebswirtschaftliche Gestaltung des Obstbaues. **(Management in fruit growing.)**
Reprinted from *Lecture Ser. 5th Mtg agric. Fac. Univ. Bonn-Poppelsdorf*, 1951, pp. 14.

The economic aspects of German fruit growing, with special reference to the Rhineland, are outlined briefly in the introduction. The main part of the paper is divided into two sections. The first, discussing new fruit plantations, includes: general considerations, intensity grades in fruit growing, types of fruit farms and of trees grown thereon. In the second section on cultural requirements, soil, fertilizers, pruning, thinning, plant protection, and harvesting and grading are described with regard to the cost of these operations.

2129. REBOUR, H., AND HAUVILLE, A.
Étude du climat algérien en vue de déterminer les zones les plus favorables au séchage des fruits. **(The Algerian climate with reference to the zones favourable for fruit drying.)**
Ann. Inst. agric. Algér. 1951, **6**: 2: 1-42, bibl. 9, illus. + maps.

An account of the climate of Algeria is given, in relation to the various regions where tree fruits are grown for drying. The climatic factors discussed are the atmospheric humidity, temperature, winds, cloudiness, sunshine, rain and storms. The fruits mentioned are apricot, peach, plums and prunes, grapes and figs. Seven large maps show the different fruit regions with their weather conditions during the critical summer months.

2130. POTTER, J. M. S.
The history of the apple.
J. roy. hort. Soc., 1952, **77**: 65-75, illus.

In this paper, read to the British Association at Edinburgh in 1951, the author deals with the probable origin of the apple and its history. References to this tree in ancient and mediaeval literature are mentioned, and the development of its culture is outlined. The major part is, however, concerned with the application

of scientific methods to the improvement of varieties and cultural practice from the latter part of the nineteenth century onwards. Work done at Woburn Experimental Farm and later at Long Ashton, East Malling and John Innes is described, and the problems discussed include rootstock selection, improvement of pruning methods, physiological investigations, manuring, orchard management and pest and disease control.

2131. Allen, F. W., Thomas, H. E., and Borden, A. D.
Apple growing in California.
Circ. Calif. agric. Ext. Serv. **178**, 1951, pp. 73, bibls., illus.

A very informative circular dealing with the position of the industry in the state, including market outlets and costs; the most important commercial and garden varieties, with colour illustrations of 18 of them; cultural practices; pests and diseases; harvesting, packing, storing and processing.

2132. Rasmussen, E. J., and others.
Growing apples in New Hampshire.
Ext. Bull. N.H. agric. Ext. Serv. **100**, 1951, pp. 31, bibl. 5, illus.

Apple production is the leading fruit industry in New Hampshire. In this bulletin advice is given on selection of site and size of orchard and the equipment required. Suitable varieties, rootstocks, pollination, soil management and fertilization are discussed and considerable space is devoted to planting and pruning and to the control of pests and diseases.

2133. Cuénot, G.
L'abricotier au Maroc. **(The apricot in Morocco.)**
Fruits d'Outre Mer, 1951, **6**: 459-65, illus.

Seedling apricots known as Mech-Mech are widely grown in Morocco. After the war they met with a ready demand for the manufacture of jam and pulp, but in the past 2 years this demand has practically ceased. The better orchards are based on early grafted varieties, the best of which are Del Patriarca, Newcastle early, Bullida and Canino. These are raised on Mech-Mech stocks, 30 strains of which were tested without revealing any significant difference in vigour. On the other hand certain strains appear to be much more resistant to capnodis than others. The article also gives a brief account of soil and climatic requirements, methods of cultivating, planting and summer pruning and the disposal of the crop.

2134. Breviglieri, N.
Il pesco in Francia. **(The peach in France.)**
Ital. agric., 1951, **88**: 479-92.

The author's figures for 1946-1950 show that much the biggest producer of peaches during that period was the U.S.A. with 15·7 million quintals a year followed by Italy with 2·3, Argentina 1·4 and France 1·05, Australia 0·5, Spain and Mexico with 0·47 each, Canada 0·38 and, somewhat lower in the list, South Africa 0·16 million quintals. In France serious cultivation is confined, except for 2 patches near Paris, to a wedge of country running south-east from Vienne to the maritime Alps and another area S.E. of Bordeaux. A detailed account is given of varieties and rootstocks used. The latter include peach seedlings, St. Julien seedlings, peach and almond crosses, seedling almonds, *Prunus davidiana* and peach × *P. davidiana* hybrids, each with their particular advantages and disadvantages, which are here discussed. Strict government regulations are applied to the marketing of the main commercial varieties, viz. Mayflower, Charles Ingouf, Hale's Early, Benoni, Gaillard, Precoce de Flachat, Incomparable Guilloux, Early Elberta and J. H. Hale.

2135. Hansen, C. J., Wilson, E. E., and Smith, L. M.
Prune production in California.
Circ. Calif. agric. Ext. Serv., **180**, 1951, pp. 39, bibl. in text, illus.

Information is given on production areas, varieties and rootstocks, planting and management, and pests and diseases. Processing techniques are not dealt with.

2136. Tomšík, B.
Možnosti výsadby moruše bílé do dalších oblastí Čech a Moravy s přihlédnutím k její ekologii. **(The possibilities of growing white mulberry in Bohemia and Moravia with reference to its ecology.)** [Russian summary 2 pp.]
Acta Univ. Agric. Silvic. Brno, 1951, No. 3-4, pp. 43-67, bibl. 12, illus.

Detailed botanical descriptions of the three main species of mulberry, *Morus alba*, *M. nigra* and *M. rubra*, are given and lesser known species and varieties are mentioned. Although white mulberry requires 152-161 days for the thorough maturation of its wood, being then capable of withstanding winter frost, it is considered that the climate and soil conditions of Bohemia and Moravia are very favourable for its cultivation. When used for silk worm feeding ($\frac{1}{2}$ to $\frac{2}{3}$ of total leaf area is lost) proper attention should be paid to its cultural requirements.

2137. Turrill, W. B.
Wild and cultivated olives.
Kew Bull., 1951 (issued 1952), No. 3, pp. 437-42, bibl. 13, illus.

A very large number of variants of the cultivated olive, *Olea europaea*, exist and have been given vernacular names. Several classifications, usually based on the general shape and apical characters of the fruit, have been proposed, but these have been mostly derived from inadequate material or from the olives of a restricted area. The author has himself seen two so-called varieties on different parts of the same tree. As regards wild olives, often called var. *oleaster*, no convincing proof has been found for the assertion that cultivated varieties may revert to var. *oleaster* if neglected and that conversely wild olives can be turned into cultivated kinds. The genus *Olea* requires monographing because all general accounts are much out-of-date. Although about 85 species have been described it may be possible to reduce this number considerably. Apart from *O. europaea* the species of greatest interest is *O. chrysophylla* and its microspecies or varieties. The possible origin of the cultivated olive is discussed and it is suggested that a cytological study and genetical experiments should be made with plants grouped as *O. chrysophylla* and with plants showing characters linking this species with *O. europaea*. The careful collection and analysis of adequate material

in flower and in fruit from the same individuals should also be made.

2138. DE ARESPACOCHAGA, J.
La tierra y el trabajo en la oleicultura mediterranea. **(Land and labour in olive production in the Mediterranean basin.)** [English and French summaries 1½ p. each.] *Bol. Oleic. int.*, 1951, No. 5, pp. 13-25, 84-6, 91-2.

Seventy-five per cent. of the olive land in the major olive-producing countries of the Mediterranean basin is unsuitable for the economic production of other crops. Tables are given showing the area devoted to olive production in each of 13 Mediterranean countries, the number of trees, the area in which olives are grown alone and in association with other crops, and the economic value of the industry. It is interesting to note that a very large proportion of the cultivated land is under olives in Palestine, Greece and Portugal. Data are given on the amount and cost of labour in each country and its seasonal variation.

2139. TAMÉS, C., AND OTHERS.
Estudio del medio óptimo. **(A study of optimum environmental conditions [for the olive].)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 3-23.

The optimum climatic and soil conditions for olive growing, which are here enumerated in detail, include average winter (Dec.-Feb.) temperatures of not less than 9° C., average daily temperatures of not less than 10° C. in March, 15° C. in May, June and October, or 20° C. in July, August and September, and not more than 32° C. in May and June or 36° C. in July-October. Rainfall during autumn, winter and spring should be sufficient to prevent excessive transpiration during this period and during flowering. Rains during June and July may adversely affect pollination. The best soils are calcareous silts. The environmental conditions existing in some olive growing districts of Spain are discussed, climatic and soil data being tabulated.

2140. BONNET, P.
Estudio del medio óptimo. **(A study of optimum environmental conditions [for the olive].)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 25-7.

A brief account of the soils and climates of the olive growing areas of France and their effect on production. The most important factor limiting olive growing in France is low winter temperature.

2141. VERNET, A., AND SERRES, J.
Estudio del medio óptimo. **(A study of optimum environmental conditions [for the olive].)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 28-35.

In Tunis the olive grows wild in areas of comparatively high rainfall and good soils, mainly in association with the mastich tree. Its natural habitat and the conditions under which it is cultivated are compared. It is concluded that the areas where olives grow naturally could be used for the cultivation of other crops, whereas olives could be grown satisfactorily in arid districts with an annual rainfall of 180-400 mm.

2142. ANAGNOSTOPOULOS, P. T.
La producción y su regulación. **(Regulating production [of olives].)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 120-1.

Experiments in various parts of Greece have shown that olives will bear regularly and yield 15-30 kg. per tree if the following conditions are provided: soil at least 2 m. deep, well supplied with moisture and N, P, K and Ca; annual pruning to maintain a good supply of first and second year wood, the type of pruning being adapted to the environmental conditions; soil cultivation in October to incorporate manure and the seeds of the green manure crop, and in February to plough in weeds and the cover crop. Trees given this treatment bore fruit about 45% larger, with more flesh and containing 13-33% more oil than the controls.

2143. MARINUCCI, M.
Producción y regularización de la producción. **(Regulating production [of olives].)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 122-30, bibl. 31.

A review of recent Italian work on the effect on olive production of pruning, bark ringing, defoliation, nutrition and the application of hormone sprays to prevent pre-harvest drop.

2144. D'ALMEIDA, F. J.
Producción y regularización de la producción. **(Regulating production [of olives].)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 131-8, bibl. 11.

A review of the effect on production of olives in Portugal of rootstock, methods of propagation, cultivation, irrigation, pruning, fertilizing, and harvesting.

2145. ARRUÉ, A., AND OTHERS.
Producción y regularización de la producción. **(Regulating production [of olives].)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 115-19.

Recommendations are made for irrigating, pruning and fertilizing olives in Spain.

Varieties.

2146. BROOKS, R. M., AND OLMO, H. P.
Register of new fruit and nut varieties. List 6.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 386-404.

The new list contains descriptions of the following new varieties: 1 almond-peach, 37 apples, 3 apricots, 4 avocadoes, 5 blackberries, 5 blueberries, 5 cherries, 1 cherry-plum, 1 red currant, 2 filberts, 18 grapes, 4 guavas, 2 nectarines, 8 oranges, 36 peaches, 10 pears, 2 pecans, 2 persimmons, 16 plums, 2 prunes, 5 raspberries, 14 strawberries, 1 tangerine and 1 walnut.

2147. CHAUDHARI, I. I.
The fruits of Chitral State.
Punjab Fruit J., 1951, **15**: 51: 11-14.

No part of Chitral State is less than 4,500 ft. above

sea level. Brief descriptions are given of the main varieties grown there, in order of abundance, of apricot, mulberry, walnut, grape, apple, pear, chilghoza, pomegranate, cherry, plum, peach, amlok, fig and almond.

2148. TYDEMAN, H. M.
Michaelmas Red—a new dessert apple.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, p. 100.
The characters of this new deep red variety, raised at East Malling from a cross between Worcester Pearmain and McIntosh Red, are described briefly. It matures immediately after Worcester Pearmain is finished.

2149. EINSET, J., AND LAMB, B.
Chromosome numbers of apple varieties and sports III.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 103-8, bibl. 9, being *J. Pap. N.Y. St. agric. Exp. Stat.* **859.**
A table is supplied listing 103 diploids, 7 triploids and 5 diploid-tetraploid chimaeras (large-fruited sports) with notes on the source of the trees and type of apple. The varieties listed are from the collection at Geneva, N.Y., and include introductions of culinary, dessert and cider apples from England, Poland and Russia.

2150. JAIVENOIS, A.
La poire Durondeau. **(The Durondeau pear.)**
Fruit belge, 1952, **20**: 57-60, illus.
The Durondeau pear is discussed under (i) origin and distribution, (ii) description of the fruit, (iii) soil and aspect, (iv) vigour and fertility—forms and pruning, (v) care in cultivation and picking, (vi) resistance to diseases (the variety is very susceptible to scab and must be regularly sprayed until July; wettable sulphur gives excellent results, but lime-sulphur, if applied too often, checks the development of the leaves and so affects adversely the size of the fruits).

2151. FOGLE, H. W.
New stone fruit varieties for the Pacific northwest.
Proc. 47th annu. Mtg Wash. St. hort. Ass. 1951, pp. 99-102.
A brief description is given of varieties of peach, apricot, sweet cherry and plum which seem sufficiently hardy under the climatic conditions of the Irrigation Experiment Station, Prosser, Wash., and have promising fruit characteristics.

2152. JACKSON, T. H., AND ROGER, B. E.
Plum variety trials at the Horticultural Station, Molo, Kenya.
E. Afr. agric. J., 1951, **17**: 24-6.
This progress report records preliminary observations and tentative recommendations from a trial of 28 Japanese plum and 2 prune varieties planted in 1946-50. The following varieties are recommended for planting at various altitudes: Methley, Settler, Tazagine, Apricot, Beauty, Beckie Smith, Hale, Jardine's Early, October Purple, Satsuma, Shiro and Wilson; the first 2 and possibly the third variety named are recommended for planting on their own roots, for which the local nursery practice is described. No recommendations can yet be made regarding 15 varieties. Both d'Agen Prune and Sugar Prune are very susceptible to prolonged dormancy and are not recommended. High winds, birds and drought conditions are adverse factors with late varieties. A.C.S.

2153. DE SONNAVILLE, P.
De mirabellenteelt. **(Culture of mirabelles.)** [English summary 10 lines.]
Meded. Dir. Tuinb., 1952, **15**: 195-205, bibl. 11, illus.
In southern Holland the mirabelle (a yellow form of *Prunus insititia*) is grown on good soils for canning, the cost of production being similar to that for other plums. A trial has been started with types of Mirabelle de Nancy grafted on different rootstocks (St. Julien A, Brompton, Myrobalan B and Mirabelle). The characters of a number of varieties are tabulated for comparison. A severe attack of *Cladosporium carpophilum* on fruits has been reported.

Propagation and rootstocks.

(*See also* 2069, 2171, 2191.)

2154. KARNATZ, H.
Über die praktische Anwendungsmöglichkeit der topographischen Keimprüfungsmethode mittels 2-, 3-, 5-Triphenyltetrazoliumchlorid bei Obstsämereien. **(On the practical application of the topographical seed testing method of fruit seeds by means of 2, 3, 5-triphenyltetrazoliumchloride.)** Reprinted from *Saatgut-Wirtschaft*, 1951, No. 4, pp. 82-4, bibl. 2.
In trials conducted at Jork, Germany, on certain pome and stone fruit seeds reasonable agreement was found between the tetrazolium value and the actual percentage of germination. As, however, results with old seed, particularly of stone fruits and all seed given heat treatment and then dry stored for 3-4 weeks, were unreliable, it is suggested that the method requires improvement.

2155. ČERNÝ, L.
Modifikace Mičurinova příborku k zakořeňování ovocných stromů. **(Modification of the Mičurin apparatus for the rooting of fruit trees.)** [English and Russian summaries ¼ p. each.]
Sborn. čsl. Akad. Zeměd. 1949, **22**: 611-20, bibl. 9, illus.
Mičurin's apparatus for aerial rooting by which ringed parts of shoots are sealed in a glass tube of sterilized water was modified in certain ways including the use of an opaque tube, and by using either indolylacetic acid in a 10^{-5} mol. concentration, a mixture of indolylbutyric acid and *cis*-thiophen-dicarboxylic acid, both in 10^{-10} mol. concentration, or α-naphthylacetic acid in the initial stages, to be replaced later with sterilized water. Rooting was obtained in Green, Malvazinka and Blue plums on shoots carrying fruit. The treated shoots, whether rooted or not, passed through an accelerated process of maturing, variations in the rate of which may be related to the frost resistance of individual varieties.

2156. Černý, L.
Modifikace Mičurinova příborku k zakořeňování ovocných stromů. II. část. **(Modification of the Mičurin apparatus for the rooting of fruit trees. II.)** [English and Russian summaries ½ p. each.]
Sborn. čsl. Akad. Zeměd., 1951, **24**: 248-59, illus.

Further modifications of Micurin's apparatus for aerial rooting are described in which provision is made for the respiration of the developing roots and the lignification of their roots. The method of preparing the shoot [plums, etc.?] has been altered by the use of a circular cut in which a linen thread is inserted to prevent rejoining, in place of the previous ringing. It was found most satisfactory to use heavily leafed shoots exposed to the sun, whose growth had been stopped by breaking the terminal. It was noticed that on rooting the yellowing of the leaves [accelerated maturation] ceased, and they became green again. After lignification of the basal part of the roots the shoots were cut off, the non-lignified roots removed and the cutting planted.

2157. van Belle, G.
Type IV op rivierkleigrond. **(Malling IV rootstock on river clay soil.)**
Fruitteelt, 1952, **42**: 169-70.

The cultivation of apple trees, particularly the varieties Jonathan and Golden Delicious, on river clay soil in the Netherlands is discussed. Observations in recent years have shown that M.IV is of great importance as a rootstock on such soils, which usually have a low potash content. Leaf analyses have shown that M.IV takes up potash more readily than other rootstocks. When trees on M.XI and IX show marginal leaf scorch as a result of potash deficiency those on M.IV often show no trace of it.

2158. Cruz Valero, A., Ortega, M., and de la Vega, T.
Multiplicación. (Estudio de los portainjertos, estudio botánico de los oleastros y plan de siembra.) **(Propagation [of olives].)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 81-4.

Comments are made on the relative value of the various methods of olive propagation practised in Spain. More research is needed on the performance and compatibility of the wild and cultivated olives used as rootstocks.

2159. Marinucci, M.
Multiplicación (Estudio de los portainjertos, estudio botánico de los oleastros y plan de siembra). **(Propagation [of olives].)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 89-93, bibl. 17.

A review of some recent Italian work on the root system of olives, the anatomy and physiology of ovuli, the use of hormones in rooting olive cuttings, rootstocks and the botany of wild olives.

2160. de Lychnos, N.
Los mejores portainjertos del olivo en Grecia. **(The best olive rootstocks in Greece.)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 101-2.

Although the seed of the wild olive germinates much more readily than that of cultivated varieties, the tree remains low and bushy and often shows incompatibility with scions of commercial varieties. Semi-wild olives, however, i.e. naturalized seedlings from cultivated trees, show less incompatibility and the seed germinates fairly well. Tests in Corfu have shown that the germination of seeds of semi-wild trees is 65-75%, whereas that of seeds of cultivated trees varies from 2 to 25%. The semi-wild olive is therefore considered the best rootstock for olives in Greece.

2161. Anagnostopoulos, P. T.
Multiplicación. (Estudio de los portainjertos, estudio botánico de los oleastros y plan de siembra.) **(Propagation [of olives].)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 85-8, bibl. 1.

If olives are grown from seed and budded in the nursery, they will start to bear fruit when they are 4-6 years old, and will be in full bearing at 15-25 years. This is earlier than trees propagated from cuttings. The disadvantages are lack of uniformity of the seedlings and their uncertain compatibility with commercial varieties. These disadvantages could be overcome by propagating seedling rootstocks of known performance from suckers. Work along these lines has already been started at the School of Agronomic Studies, Athens. The variable germination of olive seed is another problem in the propagation of seedling rootstocks, but experiments carried out by the author have shown that good germination can be obtained if the temperature is kept at 8·5–15° F.

2162. De Capite, L.
L'innesto dell'olivo sulla radice. **(Root grafting the olive.)**
Ital. agric., 1951, **88**: 695-701, illus.

A rather sketchy account of a method learnt at Barcelona in Spain. The author considers that crown grafting on healthy root offers many advantages over crown grafting on the stem, better unions being formed, less subject, moreover, to rot.

2163. Servicio de Horticultura de Rabat.
Observaciones sobre la altura de los brotes producidos por plantones de olivos después de un año de vegetación, con distintos diámetros. **(Observations on the length of the shoots produced in one year by olive cuttings of different thicknesses.)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 94-6.

Observations made in a nursery in Morocco led to the conclusion that the diameter, within a range of 33-100 mm., of cuttings 30 cm. long has no significant effect on the length of shoots produced during the first year.

Pollination.

(*See also* 2062, 2237g, j.)

2164. van Onsen, J. G.
De bevruchtingsverhoudingen der fruitsoorten. **(The fertilization relations of fruit varieties.)**
Cult. Hand., 1952, **18**: 26-8, 100-1.

This article consists of two chapters, the first dealing

with pollination and the causes of sterility, the second with fertilization. The latter includes (1) lists of apple and pear varieties that yield abundant pollen and others which yield little, (2) percentage pollen germination of a number of plum and cherry varieties, (3) lists of diploid and triploid apples and pears.

2165. BLASBERG, C. H.
A preliminary report on spraying pollen to apple trees in commercial orchards.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 23-5, bibl. 6, being *J. Pap. Vt agric. Exp. Stat.* **21**.

No set of fruit occurred when pollen was applied to trees in spray suspensions with a speed sprayer or a high pressure sprayer, though heavy sets occurred when the same pollen was applied by hand. It would appear that pollen is seriously macerated by modern sprayers.

2166. TYDEMAN, H. M.
The influence of the pollen parent on the development of apple fruits.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 62-6, bibl. 7.

In 1950 and 1951 Cox's Orange Pippin apples derived from pollen of King of the Pippins were significantly larger than apples derived from Worcester Pearmain pollen. The pollen of Ellison's Orange and James Grieve in 1950 and of Miller's Seedling in 1951 produced fruit of intermediate sizes. Differences in fruit size were generally greater when all the fruits on the tree were considered than when only those reaching maturity were compared. Spraying with α-naphthaleneacetic acid considerably reduced these differences, but whether the trees were sprayed or not there was a significantly greater weight of seeds in fruits from King of the Pippins than in those from Worcester Pearmain. No effects on time of maturity or fruit quality were detected.

2167. TYDEMAN, H. M.
The effect of the time of pollination on fruit development and maturity in Cox's Orange Pippin apples.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 67-9, bibl. 2.

Cox's Orange apple trees were brought into flower and pollinated under glass in 4 groups between 14 March and 20 April. The fruits on the late pollinated trees grew much faster during the first 3 weeks following pollination than those on the early pollinated trees. Thereafter the fruit of all groups showed a similar rate of increase in diameter, and when they reached maturity at approximately the same time the differences in their mean weights were not significant. Fruits from the later pollinated flowers had a slightly greater number and weight of seeds and embryos, but the differences were not significant.

2168. BERNHARD, R., DELMAS, H.-G., AND SANFOURCHE, G.
Recherches sur la pollinisation de quelques variétés de pruniers. **(Investigations on the pollination of certain plum varieties.)**
Ann. Amél. Plantes, 1951, **1**: 179-209, bibl. 54, illus.

Observations were made on the compatibility of some 50 plum varieties from which the following four self-sterile varieties were selected for closer study: Coe's Golden Drop, Reine Claude (several types), Agen (type A, a large-fruited strain) and Mirabelle dorée. Their most suitable pollinators were determined in extensive tests, data from which are tabulated. As a by-product of these experiments it was found that the number of little fruitlets formed is a varietal characteristic and not an indication of the percentage of flowers fertilized. The records also showed that the pollen used has no influence on colour, shape or weight of fruit, earlier reports of metaxenia being ascribed to lack of statistical method. Several ways were explored of ensuring good fruit set in an orchard composed of self-incompatible varieties with an insufficient number of pollinators among them. The simplest method of overcoming incompatibility appears to be to tie large blossoming branches of the pollinating variety on to the orchard trees. Preliminary results suggest that one such branch is sufficient to pollinate four trees, provided it is in full bloom and kept fresh by standing it in water.—Stat. Rech. vitic. et d'Arboric. fruit. du S.-O.

2169. GENTILE, R.
Investigación sobre la biología floral y experiencias de fecundación cruzada en algunas variedades de olivo cultivadas en la provincia de Pescara. **(Investigations on floral biology and experiments in cross pollination with some olive varieties grown at Pescara [Italy].)**
Olivicoltura, 1951, No. 9, from abstr. in *Bol. Oleic. int.*, 1951, No. 5, pp. 67-8.

A study of the pollination requirements of some olive varieties in the Pescara province of Italy led to the conclusion that most of the varieties were self sterile. The best pollinating varieties are noted. Observations were also made on ovary abortion in the varieties studied.

2170. MORETTINI, A.
La importancia práctica de la biología floral y de la fructificación en las variedades de olivo. **(The practical importance of investigations on floral biology and fruiting in olive varieties.)**
Feuilles d'Inform. oleicoles int., 1951, No. 5, from abstr. in *Bol. Oleic. int.*, 1951, No. 5, p. 61.

The work on self-fertility and self-sterility in Italian olive varieties is reviewed, and methods of determining fertility and selecting a suitable pollinator are described.

Structure and growth phenomena.

2171. THOMPSON, E. C.
Anatomical studies of stems and roots of hardy fruit trees. V. The histology of the roots of the apple Malling crab C when budded with certain scion and rootstock varieties.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 76-81, bibl. 9, illus.

The anatomy of the roots of Crab C rootstock was examined in three-year-old trees budded with four apple varieties, four rootstocks and Crab C itself as control. The root structure was compared with the scion stem structure within each combination of rootstock and

scion. The scions varied greatly in growth and fruit bud formation and in the structure of their stems. Histological examination showed no correlation between the structure of scion stem and rootstock root for the relative size and amount of xylem fibres, vessels, and parenchyma cells; the amount of xylem ray tissue; and the bark percentage; but there was some slight indication that the greater the amount of total living tissue in the stem of the scion variety the greater the amount of total living tissue in the root of the Crab C rootstock on which it was budded. [Author's summary.]

2172. KUROKAMI, T., AND KURAOKA, T.
Studies on the root growth of "Iwai (Summer Pearmain)" apple on the hill side slope. [Japanese with English summary 2½ pp.]
Tech. Bull. Kagawa agric. Coll., 1949, **1**: 1: 36-45, bibl. 5.

The root systems of two 10-year-old Iwai (Summer Pearmain) apple trees, one growing on a hill top and the other half way down the slope were examined. The roots of the upper tree weighed 22·3 kg. and of the lower 18·9 kg. There were differences in the proportions of fine, medium and large roots, but little difference in horizontal distribution, which appeared to be governed by orchard crowding. The root system of the lower tree was deeper than that of the upper. The root system of the lower tree was divided in half across the slope; the upper portion contained 1·39 times more roots by weight than the lower portion. The top growth of the lower tree was heavier than that of the upper tree, and the top/root ratios were 3·19 and 2·07 respectively.

2173. MOSSE, B.
A study of the bark-wood relationship in apple stems.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 70-5, bibl. 4, illus.

The bark [cortex *plus* phloem] percentage of stems of several apple varieties on a range of rootstocks was determined by calliper measurements. It was found that scion shoots on dwarfing rootstocks had a greater bark percentage than shoots of the same scion variety on vigorous rootstocks. Differences in bark percentage did not occur equally on trees of all ages, but were greatest where trees on the dwarf rootstocks were already cropping fully while comparable trees on vigorous stocks were still mainly vegetative. It is suggested that there is a direct rootstock effect on the bark percentage, which persists throughout the life of a tree, and that there is also an increase in the bark percentage of both grafted and unworked trees, when a tree enters the fruiting phase. [Author's summary.]

2174. BAIN, J. M., AND ROBERTSON, R. N.
The physiology of growth in apple fruits. I. Cell size, cell number, and fruit development.
Aust. J. sci. Res., Ser. B, biol. Sci., 1951, **4**: 75-91, bibl. 9.

The problem of fruit size in the Australian apple variety Granny Smith was examined in relation to mean cell size and mean cell number. Cell size gradients in the fruit and changes in cell shape and packing during development were noted. Observations of workers on other varieties that cell division ceased within four weeks of pollination were confirmed. Variation in size of fruits at maturity was shown to be due mostly to variation in cell number and only to a small extent to mean cell size. Cell enlargement was shown to continue throughout the life of the fruits on the tree. [Authors' summary.]

2175. ROBERTSON, R. N., AND TURNER, J. F.
The physiology of growth in apple fruits. II. Respiratory and other metabolic activities as functions of cell number and cell size in fruit development.
Aust. J. sci. Res., Ser. B, biol. Sci., 1951, **4**: 92-107, bibl. 21.

The relationship of respiratory activity and quantities of the chemical constituents to fruit size, cell size, and cell number in apple fruits of the variety Granny Smith were examined. In an experiment on mature fruits, size of fruit was primarily due to cell number, but larger cells contained more protein nitrogen than smaller cells. Soluble nitrogen and protein nitrogen were strongly correlated. Correlations between respiration rate per cell and cell volume, and between respiration rate per cell and protein nitrogen per cell were low. In a fruit growth experiment, changes in carbohydrate fractions, organic acids, protein and total nitrogen, cell wall material, and respiration rate were compared on a unit cell basis. Sugars, particularly sucrose, increased markedly during growth, starch increased at first and decreased subsequently, and cell wall substances increased in proportion to increase in cell surface. Soluble and protein nitrogen increased together, more in relation to increase in cell surface than to increase in cell volume; this is interpreted as an increase in cytoplasm of approximately constant thickness during the enlargement of the vacuole. Respiration rate which, after a slight decrease, increased in proportion to increase in protein nitrogen, finally increased more rapidly than protein nitrogen at the time that starch was disappearing and unknown organic acids were increasing rapidly compared with malic and citric acids; the bearing of these observations on a new hypothesis of the cause of the climacteric rise in respiration is discussed. [Authors' summary.]

2176. LJONES, B.
Tilveksten hos eple. **(The growth rate of apple fruits.)** [English summary 2 pp.]
Meld. norg. LandbrHøgsk., 1951, **31**: 309-40, bibl. 13, plus graphs, being *Meld. Inst. Fruktdyrk. Fruktkons. norg. LandbrHøgsk.* **23**.

During the years 1946-50 the growth rate of several apple varieties was investigated by measuring the fruit size every 10 days from the June drop to maturity. Fruit size and weight increase per apple per day at various dates were computed on the basis of fruit weight and diameter at harvest, and the diameter measured through the summer. No particular period was marked by a particularly high growth rate every year, but the largest weight increase was ordinarily found in August. The quotients for the ratio between transverse and longitudinal diameters indicated that, as growth proceeds, the transverse diameter of the apple increases more than does the longitudinal one,

and that this is most marked during the most intensive growth period in August. The most intensive growth often took place during periods of relatively high rainfall following relatively dry periods. Thus a large relative increase in precipitation led to a strongly rising growth rate. This was even true of the wet summer of 1950. In the dry summer of 1947 a small irrigation experiment was carried out with the variety Säfstaholm. Where the trees had been irrigated, the average fruit weight at harvest was 69·3 g. compared with 57·4 g. for the check trees. Whereas the growth rate during July and August seemed to follow the variations in precipitation and air humidity, a better agreement between weight increase and temperature was found around harvest time. A study was also made of the relationship between weight increase and fruit fall around harvest time. In 1949 it was found for the variety Gravenstein that, for a 10-day period immediately preceding the mean harvest date, the average increase in kg. per unit area exceeded the weight of the fallen fruit. The crop of that year was low. In 1948, which was a good year, the weight increase of the same period represented 47% of the weight of the fallen fruit. The percentage for 1950 was 81. The weight increase for a 10-day period following the mean harvest date for 5 varieties averaged 3·16% for 1948 (large crop, cool weather), and 11·97% for 1949 (moderate crop, warm weather). [From author's summary.]

2177. Fisher, D. V.
Time of blossom bud induction in apricots.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 19-22, bibl. 3, being *Contr. Div. Hort., exp. Fms Serv., Dep. Agric., Ottawa* **763**.

Studies over 3 years on 6 varieties at Summerland, B.C., which involved fruit thinning and branch ringing, indicate that the time during which blossom bud induction in apricots can be influenced is not entirely constant from year to year, and varies from 38 to 55 days after full blossom. Treatments applied after 38 to 41 days from full blossom were, however, less effective. These findings, which are essentially in agreement with those reported for apples, emphasize the importance of early thinning for biennial bearing varieties of apricot such as Blenheim and Tilton.

2178. de Zeeuw, A.
Parthenocarpie bij perzik ? **(Parthenocarpy in peaches ?)**
Meded. Dir. Tuinb., 1952, **15**: 192-4, bibl. 1, illus.

Abnormal fruits of the early peach varieties Amsden and Gloire Lyonnaise, and the late variety Sea Eagle were much smaller but sweeter than usual; in the early varieties they were flatter and in Sea Eagle more one-sided than normal. The stones were small, the seeds watery and without embryos. This suggests parthenocarpy.

2179. Farmer, A.
"Bud sports" and chimaeras.
Orchard, N.Z., 1952, **25**: 1: 3-4, illus.

A general account of bud sports and chimaeras and their cause in fruit trees, with illustrations of a sectorial chimaera in Washington Navel orange, and mericlinal and periclinal chimaeras in apples.

Soil management and intercropping.

(*See also* 2097.)

2180. Longley, R. P.
Response of apple trees to various cultural treatments.
88th A.R. N. Scotia Fruit Grs' Ass., 1951, pp. 103-7.

Under the conditions of the experiment, started in 1940 at the Kentville Experimental Station, trees on cultivated cover crop plants (buckwheat and vetch) were superior to those on permanent sod plots. They produced about five times as much fruit as grass sod trees and twice as much as ladino sod trees. Natural weed cover crops and mulch were also found satisfactory. The varieties concerned were McIntosh and Golden Russet on E.M. XII and Wagener on E.M. II.

2181. Bonnet, P.
Estudio de los cultivos asociados al olivo. **(A study of crops associated with the olive.)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 58-63.

Intercropping of olives in France is rarely practicable because olives are closely planted on the poorest, driest soils, with insufficient moisture even for green manure crops. The only cultural association possible is to alternate rows of olives with rows of other woody plants such as figs, apricots or vines. The production of secondary crops in association, but not interplanted, with olives, however, is advocated, vines being considered especially suitable.

2182. Ortega, M., Herrera, F., and Cruz Auñón, P.
Estudio de los cultivos asociados al olivo (cultivos intercalados, cultivos yuxtapuestos). **(A study of crops associated with the olive: intercrops and secondary crops.)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 53-4.

The problem of growing secondary crops in olive zones is especially important in arid districts, and success will depend on climate, soil conditions and spacing. Research and experience in Spain have shown that: (1) At a spacing of 10-12 m. olives may be intercropped with cereals or legumes for the first 6-8 years or with vines for the first 10 years. (2) Later, if there is a rainfall of 400 mm. or more during the period October-March, legumes can be grown in alternate rows across the slope to prevent erosion. (3) In mature plantations with adequate rainfall green manuring may be practised every 4-5 years. (4) In irrigated, widely-spaced plantations spring crops such as potatoes and beans may be grown. (5) In suitable climates tree crops such as figs and almonds may be interplanted along the contour. (6) Investigations are needed to determine the legumes most suitable for growing in association with olives in each district.

2183. de Vasconcellos, M. T.
Estudio de los cultivos asociados al olivo (cultivos intercalados, cultivos yuxtapuestos). **(A study of crops associated with the olive: intercrops and secondary crops.)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 55-7.

Experience in Portugal has shown that it is economic to intercrop irrigated plantations of olives with horticultural crops such as potatoes and maize. In unirrigated, young plantations, closely spaced, it is generally advisable not to intercrop. In unirrigated, mature plantations that are too widely spaced, quick growing trees such as fig and almond may be planted.

Nutrition.

2184. Ljones, B.
Kjemiske analysar til rettleiing om gjødsling i frukthagen. I Jordanalysar. (**Chemical analysis as a guide to the manuring of fruit trees. I Soil analyses.**)
Frukt og Baer, 1951, **4**: 69-78, bibl. 5, being *Meld. Inst. Fruktdyrk. Fruktkons. norg. LandbrHøgsk.* **17**.

Soil samples taken in an apple orchard at various distances from the tree and at various depths showed great variation in pH, potassium and phosphorus content. The conclusion drawn from the fully tabulated data is that soil tests are a reliable guide to fertilizer requirements only if the samples are taken below the depth of the plough. In a manurial trial an application of 30 kg. potassium sulphate in a NPK fertilizer raised the K_2O content from 13 mg./100 g. air-dry soil (NP fertilizer) to 35 mg. The yield increase associated with the higher soil potassium content was considerable. In another trial it was found that K manuring also had a significant effect on yield when the K_2O content per 100 g. air-dry soil ranged from 35 to 80-90 mg. Applications of superphosphate had little influence on available soil phosphate content or yield. Data are tabulated on the effect of manuring on soil pH, soil potassium and available phosphate content and on yield. Preliminary results are available from a further phase of the investigation which is to correlate manuring with leaf composition. It was found that the 10 uppermost leaves of a shoot may have a 25% higher potassium content than the 10 bottom leaves.

2185. Pouwer, A.
Bladanalyse bruikbaar voor de practijk ? (**Leaf analyses useful in practice.**)
Fruitteelt, 1951, **41**: 835-6.

Leaf analyses to supplement soil examinations are strongly advocated to determine fruit trees' nutritional requirements, particularly in the amounts and proportions of K, Mg and P. With reference to river-clay soil (for instance) the standard requirements for these elements are about 200, 20, and 1-3 p.p.m. respectively. When the K-content is over 300 p.p.m. and the ratio K/Mg over 20 there will be Mg deficiency; when the K-content is less than 100 p.p.m. and the K/Mg ratio less than 4 there will be K-deficiency. Leaf analyses are also said to give useful indications of fertilizer requirements in flower growing (e.g. primula) and in vegetables (e.g. tomato).

2186. Natividade, J.
Sobre a nutrição das fruteiras. (**The nutrition of fruit trees.**) [English and French summaries 8 lines.]
Bol. Junta nac. Frutas, 1950, **10**: 657-66 [received 1952].

The attention of Portuguese fruit-growers is drawn to some problems of mineral nutrition of fruit trees and the importance of interpreting nutritive deficiencies by visual diagnosis is stressed. The characteristic symptoms of deficiencies in manganese, potassium and calcium are pointed out.

2187. Kobel, F., and others.
Ein Vegetationsversuch mit Topfobstbäumen. I and II. (**Nutrition trials with fruit trees in pots. I and II.**)
Schweiz. Z. Obst- u. Weinb., 1952, **61**: 103-13, 137-40, illus.

One-year-old apple trees, variety Goldreinette Freiherr von Berlepsch on E.M. IX, were potted in a mixture of leached podsol soil, 10% very nutrient-deficient peat and 5% quartz sand. The controls received complete NPK fertilizer and Ca, Mg, B and Zn, varying amounts of these nutrients being fed to the test plants. The resultant deficiency symptoms are described and illustrated, and supplemented by chemical analyses of the tissues. This experiment at Wädenswil, now in its third year, is being continued and extended.

2188. Walsh, T., and Clarke, E. J.
Some orchard soil studies with particular reference to potash deficiency.
Trans. 4th int. Congr. Soil Sci., Amsterdam 1950, Vol. III, pp. 119-23, bibl. 7 [received 1952].

Experiments on the elimination of potash deficiency in apple trees on potash deficient, high lime soils in Ireland are described. A surface mulch of straw combined with deep application of potash proved the most effective treatment. Other types of mulch and potash application, and trunk injections of potash, iron and magnesium salts also produced good results. All these treatments corrected iron deficiency symptoms observed on the foliage. Some instances of deleterious effects due to over mulching are given.

2189. Singh, G.
Behaviour of stomata in apple leaves as affected by various soil water, nitrogen and spray treatments.
Indian J. Hort., 1951, **8**: 4: 38-44, bibl. 7.

In experiments at Ohio State University 2-year-old Richared apple trees grown in crocks in one series received 3 nitrogen treatments, N in culture solutions, N as urea spray and nil, and in another series 3 levels of watering, once, twice and seven times a week. Spraying with hexa-ethyl-tetra-phosphate and water was also compared with spraying with urea. The results showed that the percentage of stomata open was higher and the time they remained open was longer, the higher the soil moisture. When the temperature became high and the relative humidity low the percentage open declined in all cases. Trees receiving N in solution had the least number of stomata open, those sprayed with urea came next, while those receiving no N and showing N deficiency symptoms had the greatest number open. Spraying with urea and water produced a temporary increase in the number of stomata open, whereas hexa-ethyl-tetra-phosphate produced a trend in the reverse direction. The stomata remained closed at night irrespective of treatment.

Training and pruning.

2190. Maurer, K. J.
Vorläufiger Bericht über einen Stamm- bzw. Gerüstbildnerversuch. (Zweites Baumschuljahr.) (**A preliminary report on a stem builder trial. (Second year in the nursery.)**)
Züchter, 1951, **21**: 115-23.

In continuation of an earlier report [see *H.A.* 21: 3257] further results are given of observations and measurements made on stem builders. Twelve apple varieties from eastern and western Europe were studied; their synonyms and origin are given and characteristics and uses described. Hilkenbäumer's adverse criticism of Antonovka is once again challenged by the author. Because of the numerous physiological disadvantages inherent in standard fruit trees, their planting is on the decline in Germany. For this reason when choosing frame builders in future more attention will be paid to frost hardiness, compatibility and favourable influence on scion varieties than to vigour and straightness of growth. It is suggested that problems relating to frame builders should be studied on a regional basis.—Geisenheim Res. Stat.

2191. Lauber, H. J.
Auf was es beim Aprikosenhochstamm ankommt. (**The requirements of apricots grown as standards.**)
Schweiz. Z. Obst- u. Weinb., 1952, **61**: 93-5, illus.

Recommendations made for the successful growing of apricots as standard trees in German-speaking Switzerland include: the use of plum, preferably St. Julien, rootstocks; correct pruning based on the Oeschberg method; selection of suitable varieties such as Hungary's Best; and a minimum of 10 m. planting distance. Cultural requirements and plant protective measures are briefly discussed.

2192. Preston, A. P.
Pruning maiden apple trees as bushes.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, p. 199, illus.

A brief account is given of a method of pruning maiden apple trees as open centre or delayed open centre bushes. The method involves heading back, cutting back feathers to basal buds and notching, in March, ½ in. above selected buds, which will develop into branches. Unwanted shoots are removed when about 4 in. long.

2193. Havis, L.
Pruning peach trees at different periods in the spring.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 14-18, bibl. 5.

Twelve-year-old Elberta peach trees at the Plant Industry Station, Beltsville, were subjected over a 5-year period to moderately severe pruning at 4 different stages of development, namely, dormant, full bloom, shuck fall, and 3 weeks after shuck fall, and compared with unpruned trees. Pruning consisted of thinning out weak twigs and branches and heading back to lateral branches at a height of about 8 ft. Dormant pruning gave comparable yields, but considerably larger fruits than no pruning. In general, as pruning was delayed fruit sizes increased but yields dropped. Both dormant and the latest time of pruning resulted in later maturing of fruits than the other treatments. Dormant pruning produced the longest shoot growth and the largest number of flower buds per foot of shoot. It is concluded that it would be best to prune peaches during the dormant season, but that pruning even as late as 3 weeks after shuck fall is preferable to no pruning.

2194. Hauville, A.
De la meilleure utilisation de la sève des arbres fruitiers en période estivale. (**The better use of the sap of fruit trees in summer.**)
Rev. hort. Algér., 1950, **54**: 208-10.

Where water is in short supply during the summer, the value is discussed of (1) removing the young shoots from the bases of branches (in citrus), (2) removing some of the buds (vine and peach), (3) fruit thinning (peach), (4) summer pruning (particularly in peach), (5) pinching-back shoots.

Spraying to influence fruit retention.

2195. Batjer, L. P., and Uota, M.
Effect of 2,4,5-trichlorophenoxypropionic acid sprays on fruit set of pears and apples.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 33-6, bibl. 1.

Spraying Bartlett pears, which had inadequate provision for cross-pollination, with 2,4,5-T at 75 p.p.m. at the pink bud stage significantly increased both fruit set and retention, but adversely affected fruit shape and keeping quality. Similar trials in other Bartlett orchards provided with adequate cross-pollination showed 2,4,5-T to have no beneficial effects on fruit setting, and in trials on Anjou pears and Delicious and Winesap apples with concentrations of 25 and 75 p.p.m. the treatment caused a drastic reduction in setting.—U.S. Dep. Agric., Wenatchee, Wash.

2196. Griggs, W. H., Iwakiri, B. T., and DeTar, J. E.
The effect of 2,4,5-trichlorophenoxypropionic acid applied during the bloom period on the fruit set of several pear varieties, and on the shape, size, stem length, seed content, and storage of Bartlett pears.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 37-45, bibl. 4.

The application at the pink bud stage to self-pollinated Bartlett pears in 8 orchards in California of aqueous sprays of 2,4,5-trichlorophenoxypropionic acid and its alkanol amine salt at 100 p.p.m. resulted in significantly increased final fruit set, smaller fruit size and weight and fewer seeds. The shape of the fruit on sprayed trees was altered, and there was some injury both to the foliage and fruit; there were no differences, however, in storage behaviour or colour. In the spring following the trials the treated trees produced significantly less bloom than the controls. The same treatments applied to Hardy, d'Anjou and Winter Nelis in orchards planted for cross-pollination drastically reduced fruit set.

2197. Crane, J. C.
Growth-regulator specificity in relation to ovary wall development in the fig.
Science, 1952, **115**: 238-9, bibl. 5.
Trials with growth-regulating compounds to induce parthenocarpy in the Calimyrna fig have shown that different growth substances produce distinctly different achenes, though all these are without embryos. Following treatment with γ-(indole-3)-*n*-butyric acid the achenes lack an endocarp, with *p*-chlorophenoxyacetic acid they possess a non-sclerified endocarp, and with benzothiazol-2-oxyacetic acid they possess a sclerified endocarp similar in texture to that of pollinated achenes. The last named compound, applied in 1951 at 100 p.p.m., induced 100% of unpollinated but receptive syconia to mature parthenocarpically.

2198. Fritzsche, R.
Anleitung zur Bekämpfung der abwechselnden Tragbarkeit bei Apfelbäumen mit Hilfe von alpha-naphthylessigsäurehaltigen Mitteln. **(Notes on the control of biennial bearing in apple trees by means of preparations containing α-naphthylacetic acid.)**
Schweiz. Z. Obst- u. Weinb., 1952, **61**: 173-4.
Directions are given for the appropriate use of 2 commercial fruit thinning preparations, Dirigol and Frufix, containing α-naphthylacetic acid as the active principle.

2199. Vyvyan, M. C., and Trowell, G. F.
Use of sprays to control fruit drop. VIII. Further trials with NAA sprays on the apple variety Bramley's seedling.
A.R. East Malling Res. Stat. for 1951, 1952, A35, pp. 108-11, bibl. 3.
In a trial in 1949 the addition of α-naphthaleneacetic acid (NAA) at 10 p.p.m. to routine lime-sulphur+nicotine and mercurated lead arsenate+derris sprays, applied in May and June, had no appreciable effect on subsequent fruit drop in Bramley's Seedling. In trials in 1949 and 1950 NAA at 10 p.p.m. applied to Bramley's Seedling trees on the 21 to 23 September did not reduce fruit drop, which was considerable when picking was postponed for up to 1 month. This loss of fruit, amounting to about 30%, was largely offset, however, by an increase in individual fruit weight.

2200. Vyvyan, M. C., and Trowell, G. F.
Use of sprays to control fruit drop. IX. Further trials of the effects of delay in picking and of NAA sprays on fruit drop in Cox's Orange Pippin.
A.R. East Malling Res. Stat. for 1951, 1952, A35, pp. 112-14, bibl. 1.
Postponement of picking for two to four weeks in 1949 and for two weeks in 1950 resulted in considerable fruit drop in Cox's Orange Pippin. Sprays of NAA at 10 p.p.m., applied some three weeks before the normal picking date, considerably reduced the drop. Neither the severity of the drop nor the effectiveness of the spray was as great as in 1948. No significant trend in the mean weight per fruit was detected in either experiment. [Authors' summary.]

2201. Thompson, A. H.
The effect of 2,4,5-trichlorophenoxypropionic acid sprays in delaying the preharvest drop of several apple varieties.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 57-64, bibl. 8, being *Sci. Art. W. Va agric. Exp. Stat.* **435**.
Trials with 6 varieties of apple showed that single sprays of 2,4,5-T at concentrations of 5, 10 and 20 p.p.m., applied usually in August or September, effectively reduced fruit drop as compared with unsprayed controls or controls sprayed twice with NAA at 10 p.p.m. Good foliage was necessary for effective results. In some trials, notably with the early variety Williams, but not in others, 2,4,5-T produced quicker coloration and maturity. In one trial 80 p.p.m. 2,4,5-T caused the fruit to adhere so tightly as to make normal picking virtually impossible. No injuries were observed from the treatments either in the year of application or the following season.

2202. Batjer, L. P., and Rogers, B. L.
Evaluation of 2,4,5-trichlorophenoxypropionic acid for controlling the harvest drop of apples.
Proc. 47th annu. Mtg Wash. St. hort. Ass. 1951, pp. 121-4, bibl. 3.
Data presented show that under central Washington conditions 2,4,5-T is effective in preventing the drop of both Delicious and Winesap apples. Methods of application and results obtained with other chemicals are discussed.

2203. Leib, E.
Höhere Tafelobstausbeute durch " Hormonspritzung ". **(Increasing the crop of dessert fruits by hormone spraying.)**
Z. PflKrankh., 1951, **58**: 429-30.
Preharvest fruit drop in espalier-grown Alexander Lucas pears and in bush trees of Cox's Orange Pippin was considerably reduced by spraying with a French proprietary hormone preparation, Rhodofix.

2204. Bullock, R. M., and Rogers, B. L.
Color development in apples as influenced by pre-harvest sprays of 2,4,5-TP.
Proc. 47th annu. Mtg Wash. St. hort. Ass. 1951, pp. 21-2.
Results of trials indicate that 2,4,5-TP, commercially known as Colorset or Colorfix, has no influence on red colour development of apples under north central Washington conditions, with the possible exception of McIntosh and Jonathan, and that it did not accelerate fruit maturation.

2205. de Freitas da S. V., R. G.
Las fito-hormonas en el combate contra la caída prematura de los frutos del olivo. **(Growth substances for the control of premature fruit drop of olives.)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 147-76, bibl. 5.
Results of laboratory and field trials carried out at the Instituto Superior de Agronomía, Lisbon, showed that premature fruit drop in the olive varieties Gallega and Conserva could be considerably reduced by the application of the potassium salt of α-naphthylacetic

acid at a concentration of 30 p.p.m. The sodium salt of 2,4-D applied at the same concentration gave much less satisfactory results.

2206. Smock, R. M., Edgerton, L. J., and Hoffman, M. B.
Some effects of maleic hydrazide on the softening and respiration of apple fruits.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 69-72, bibl. 3.

Preliminary study shows that maleic hydrazide sprays may be used on apples to delay slightly the normal softening rate on the tree. Maleic hydrazide sprayed apples respired somewhat more slowly after harvest than unsprayed fruits. When maleic hydrazide was combined with certain "stop-drop" hormones it tended to nullify the ripening effect of the hormones without reducing their desired effect. A critical evaluation of concentration, timing, formulation, possible secondary effects, and the influence of weather conditions remains to be made. Toxicological data will be required before such sprays can be used commercially. [Authors' summary.]—Cornell Univ.

2207. Zielinski, Q. B., and Garren, R. G., Jr.
Effect of 2,4-dichlorophenoxyacetic acid and naphthalene acetic acid on increasing fruit-setting and delaying maturity of Montmorency cherries.
Bot. Gaz., 1951, **113**: 147-50, bibl. 7, illus., being *Tech. Pap. Ore. agric. Exp. Stat.* **681**.

2,4-D or NAA sprays at 10 p.p.m. were applied to 8-year-old Montmorency cherry trees at fortnightly intervals from 7 June to 19 August 1949, and at monthly intervals from 15 May to the end of August 1950. There was no response of tree or fruit to the NAA sprays. 2,4-D treatment caused a delay of 4-6 weeks in fruit maturity; in 1950 the fruit was still in good condition in early September and remained on the trees throughout the winter. There was no deterioration in quality with the exception of slightly smaller size. In 1950 a larger number of fascicles developed on each spur and more fruits on each fascicle, showing that the 1949 treatment had had a pronounced effect on flower bud differentiation. Twigs and buds analysed in winter contained a smaller amount of starch. There was no apparent change in time of blossoming or petal and leaf fall and no injury to the trees was noticed.

2208. Pickett, J. T.
2,4,5-T increases fruit size.
Amer. Fruit Gr, 1952, **72**: 3: 33.

Preliminary trials at the University of California have shown that 2,4,5-T applied to Royal apricot trees during thinning operations hastened ripening by 18 days and increased fruit size by 10%. Because of the slight foliage injury caused by the spray no commercial recommendations are yet made.

2209. Higdon, R. J.
The effects of 2,4,5-trichlorophenoxyacetic acid on the development and ripening of eighteen varieties of peach fruits.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 73-9, bibl. 1, being *Tech. Contr. S.C. agric. Exp. Stat.* **176**.

In preliminary trials 30 and 40 p.p.m. concentrations of 2,4,5-T injured peach fruits. Subsequent trials, apparently too late to affect the ripening of earlier varieties, showed that 10 and 20 p.p.m. were also injurious to fruits and foliage. There appeared to be wide variations in tolerance among the different varieties. The effect on the foliage was more marked when a low evaporation rate allowed the chemical to remain in a liquid state on the leaves for relatively long periods. Parts of fruits that remained wet for longer than usual developed highly coloured enlargements. It was observed that whole tree treatments often failed to give the same response as did large limb treatments.

2210. Zielinski, Q. B., Marth, P. C., and Prince, V. E.
Effects of 2,4,5-trichlorophenoxyacetic acid on the maturation of prunes.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 65-8, bibl. 5, being *Tech. Pap. Ore. agric. Exp. Stat.* **680**.

In trials at Beltsville, Md, and in Oregon, sprays of 2,4,5-T, particularly at 40 to 100 p.p.m., accelerated the maturation of Stanley and Italian prunes when applied about 16 to 20 days before normal maturity. At concentrations of 60 p.p.m. and over, however, some injury was caused to foliage. Dipping detached Stanley fruits in a 100 p.p.m. solution produced a similar effect.

Harvesting, marketing and processing.

2211. Fisher, D. F., and Smith, E.
Handling apples from tree to table.
Circ. U.S. Dep. Agric. **659**, revised 1951, pp. 43, bibl. 28, illus.

Information is given on the handling of apples from harvest to consumer. Recommendations are made for the correct assessment of picking maturity, depending on numerous factors, among which the number of days from full bloom is the basic one. Storage, including gas storage, is discussed at some length. Both fungal and physiological diseases are described and illustrated, as are various methods of packing.

2212. Crowe, A. D.
Harvesting for quality—maturity related to variety bloom dates.
88th A.R. N.Scotia Fruit Grs' Ass. 1951, pp. 111-18.

The number of days required for the development of 12 apple varieties grown in Nova Scotia from full bloom to harvest maturity is given. Observations have shown that with some varieties the timing of picking is of great importance, while with others it is less critical. In storage evaluations it was noticed, however, that fruit picked a week before maturity was inferior to fruit picked a week after maturity. It is suggested that certain varieties, notably Wagener, Spy and Red Rome Beauty, should in most years be left on the trees as long as practicable.

2213. Anon.
New type apple bag primarily designed for culinary apples.
Fruitgrower, 1952, No. 2930, p. 330, illus.

A Kent grower describes a picking container devised by him to reduce the amount of bruising during picking.

A bicycle tube, which can be inflated to the correct pressure, is sewn into the bottom of the rubberized canvas bag. The bag is shaped so that the picker can reach the bottom easily. Very good results have been obtained from its use during 2 seasons.

2214. ANON.
An automatic fruit picker.
Amer. Fruit Gr, 1952, **72**: 3; 26, illus.
An illustrated description is given of an automatic fruit picker operated by vacuum supplied from a small power unit. The head of the picker is raised by means of an aluminium pole and the fruit is pulled by vacuum into a conveyer tube past a flexible rubber gasket. In tests on apple and orange trees the picker speeded up harvesting, eliminated the use of ladders and did not bruise the fruit.

2215. VON ZITZEWITZ, W.
Ein Obsterntegerät, das in der Steiermark verwendet wird. **(An implement for fruit harvesting used in Styria.)**
Schweiz. Z. Obst- u. Weinb., 1952, **61**: 156-7, illus.
Describes a single-pole ladder easily constructed on the farm, for which high efficiency is claimed.

2216. NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING.
The performance of an apple grader.
Tech. Memo. N.I.A.E. **36/1161/hort.**, 1951, pp. 15, illus.
Trials on the performance of a recently developed Dutch grader [unnamed] are reported. It costs £560, is a very accurate sizer, has a throughput of the order of 12 tons in 7 hrs. and probably causes a slight amount of insignificant damage.

2217. SMITH, W. H., AND OTHERS.
Loss of quality and wastage in fresh fruits and vegetables during distribution.
Chem. Ind. Lond., 1951, No. 22, pp. 421-2.
Abstracts of 5 papers read to the Food Group (Nutritional Panel) of the Society of Chemical Industry with a report of the subsequent discussion.

2218. WOLGAMOT, I. H., AND OTHERS.
Peaches—facts for consumer education.
Agric. Inf. Bull. U.S. Dep. Agric. **54**, 1951, pp. 18, bibl. 38, 10c.
Following a brief historical survey, information is provided on the nutritive value, marketing practices, selection by consumers, and handling and preparation of peaches in the home.

2219. SIDDAPPA, G. S., ISHAQ, M., AND CHUGHTAI, I. D.
Canning of peaches and plums in Baluchistan.
Indian J. agric. Sci., 1950, **20**: 149-63, bibl. 9.
Methods and costs of canning peaches and plums were worked out at Quetta and the suitability of a number of varieties tested. With peaches the local white clingstone varieties were unsuitable but the Californian yellow clingstone varieties Sims, Gaume, Peak and Palora gave good canned products, as did Phillips, which, however, ripens too late for practical purposes in Baluchistan. The yellow freestone peaches Elberta, Lovell, Salway and Parvin and the white freestone peaches Babcock and Lukens Honey were also fairly suitable. With plums the local white or light coloured varieties *Alucha*, Quetta Gage, Peshawari, K.I and yellow *Alucha* (mixed varieties), the imported white varieties Yellow Drop and Golden Gage and the imported coloured varieties Late Orange and Reine Claude Violet gave good canned products. Highly coloured local plums like *Alu Bokhara* and the imported Santa Rosa proved unsuitable.

Storage.

2220. MANN, G.
The temperature and humidity in cold stores and the loss of water from stored produce.
Food Invest. Mem. D.S.I.R. **720**, [undated, received 1952], pp. 8, bibl. 2.
" The purpose of this paper is to show how loss of weight from produce in a store is influenced by such factors as the surface area and temperature of the cooler coil, the rate of air circulation, heat leakage into the store and, with fruit and vegetables, their rate of heat production. A means of determining the pipe surface area for a cooler which results in the reduction of drying to the most economic minimum is also suggested."

2221. PADFIELD, C. S.
Delayed storage of Sturmer Pippin apples.
Orchard, N.Z., 1952, **25**: 1: 19.
Trials were arranged to ascertain the relation between storage losses (particularly as a result of bruising), and the period of delay before storage. The results show that bruising is of secondary importance. The delay so often encountered in the orchard or in assembly sheds is a major factor in accentuating losses during subsequent cool storage.

2222. LANDFALD, R.
Vekttap under lagring av epler. **(Weight loss of apples in storage.)**
Frukt og Baer, 1951, **4**: 46-51, bibl. 4.
Data are presented on small-scale trials carried out with 13 apple varieties in cold storage and in ventilated storage at Njos in 1947/48 and 1948/49. In the second test the fruit was kept in containers of different material. The results are calculated as weight loss per day for the first 100 days.

2223. BAUMEISTER, W.
Künstliche Wachsüberzüge und Lagerfähigkeit verschiedener Apfelsorten. **(The influence of artificial wax films on the storage life of several apple varieties.)**
Angew. Bot., 1951, **26**: 36-41, bibl. 6.
Dipping apples of 8 varieties into wax emulsions reduced weight losses from respiration and evaporation as well as losses from rots during the storage period. The flavour of the stored fruit was also improved. Data from 3 years' trials are tabulated.—Münster Univ.

2224. FORD, H. W., AND ALBAN, E. K.
The influence of certain wax emulsions on the weight loss and respiration rate of Rome Beauty and Golden Delicious apples.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 99-102, bibl. 8.

Golden Delicious and Rome Beauty apples were dipped in 3 wax emulsions and, together with unwaxed controls, were stored for 0, 25, 70 and 105 days at 40° F. before being held at 70° F. to simulate retail conditions. All 3 waxes effectively reduced weight losses although there was some variation in effectiveness due possibly to variation in the thickness of the film of wax. Two of the waxes reduced the respiration rate by about 10% and the third by a smaller amount. Waxed fruit sold more readily than unwaxed.

2225. Melville, F., and Hardisty, S. E.
Storage of stone fruit.
J. Dep. Agric. W. Aust., 1951, **28**: 375-80.

In the storage investigations here described Santa Rosa plums stored best when picked with three-quarters to full red colour. It seemed likely that storage up to 6 weeks would be satisfactory. Excessive periods at 32° F. or lower are likely to produce internal browning. Narrabeen plums stored well when picked at a stage when the ground colour was definitely yellow green. At this stage the fruit began to soften and was from half to full coloured. Storage was satisfactory up to 4 weeks. The storage of Ruby Blood plums was most successful when the fruit was picked fully red, after juice and flavour had developed, but while the plums were still very firm. Long storage of this variety is unsatisfactory and 3 weeks was the safe limit in these experiments. Elberta peaches, at picking, should have a definite ground colour without undue softening to ensure satisfactory ripening out of store; they ripened unsatisfactorily when stored much longer than 4 weeks. Pre-conditioning or dual temperature storage of plums appears to be of little value for fruit exported to hot countries such as Singapore where there is a ripening temperature of about 80° F.

2226. Boyes, W. W., Ginsburg, L., and de Villiers, D. J. R.
The keeping qualities of apricots in cold storage.
Fmg. S. Afr., 1952, **27**: 68-72.

Cold storage trials with 3 apricot varieties at the Western Province Fruit Research Station, Stellenbosch, are described. In two years' trials the leading export variety Royal was stored at 29°, 31°, 34°, 37°, 40° and 45° F. or at dual temperatures for 3 weeks and ripened at 50° F. The tests showed that Royal is too subject to internal (gel) breakdown and fungal attack to be a satisfactory export variety. There was, however, considerable variation between fruits from different areas and in fruits picked at different stages of maturity. Greener fruits were less subject to breakdown, but lacked quality when ripened. The best results were obtained with fruits that withstood a pressure at picking of 15-18 lb. with a $\frac{7}{16}$ in. plunger and were stored at 31° F. Alpha apricots stored at 31° F. for 3 weeks and ripened at 50° F. showed much better keeping quality than Royal; picked when yellowish-green to yellowish-yellow when withstanding an average pressure of 16·1 lb. with a $\frac{7}{16}$ in. plunger they were rather stringy and insipid when ripened, but picked greenish-yellow to yellow when withstanding an average plunger pressure of 3·0 lb. they ripened with good texture and flavour. Samples of Bulida apricots similarly treated developed severe internal breakdown and this variety must be regarded as useless for export.

2227. Boyes, W. W., Ginsburg, L., and de Villiers, D. J. R.
Quality of plums at varying dual-temperatures.
Fmg S. Afr., 1952, **27**: 6-8, 22.

Plums exported from S. Africa to the U.K. are normally pre-cooled at 31° F. and then held at 45° F. Santa Rosa, Gaviota and Kelsey plums were treated in this way, being transferred from 31° F. to 45° F. after 2, 5, 8, 11, 14 and 17 days, and also with the temperatures reversed, i.e. being held first at 45° F. and later transferred to 31° F. The total storage period was 3 weeks. Santa Rosa and Kelsey plums stored first at 45° F. were invariably riper on removal than the corresponding samples first stored at 31° F. The Santa Rosa plums also showed more internal breakdown when stored first at 45° F., if the period at this temperature was less than 10 days. With Gaviota there was little difference between the treatments, but it was confirmed that this variety could not be kept at 45° F. for longer than 8 to 10 days without the risk of pitting and bladderiness. It is concluded that storage first at 45° F. and then at 31° F. offers no advantage over the existing system, but could be adopted at times when congestion at the pre-cooling stores becomes acute.

2228. Ogata, Y.
Physiological study on the fruit of loquat during storage. [Japanese with English summary 1½ pp.]
Tech. Bull. Kagawa agric. Coll., 1950, **1**: 3: 42-55, bibl. 10.

Fully ripe and firm but mature loquats were stored at 7°-10° C. and at room temperatures of 23°-25° C. After 11 days storage the ripe and firm fruits showed 65% and 40% spoilage respectively at room temperature and 30% and 0% in cold storage. The firm fruits kept for a further 3-5 days after removal from cold storage. Respiratory activity and changes in amounts of water, sugars and total acid determined in the loquats during storage are discussed.

Fruit composition.

(*See also* 2058.)

2229. Skard, O., and Weydahl, E.
Askorbinsyre—vitamin C—i eplesorter.
(The ascorbic acid content of apple varieties.)
[English summary 4 pp.]
Meld. norg. LandbrHøgsk., 1950, **30**: 477-515, bibl. 20, being *Meld Inst. Fruktdyrk, Fruktkons. norg. LandbrHøgsk.* **15** [received 1952].

From the extensive data on the ascorbic acid content of 99 Norwegian-grown apple varieties, assembled in 24 pages of tables, the following are of particular interest: (1) The ascorbic acid content varies largely both in the same variety (Bramley's Seedling 13 to 33 mg./100 g.) and between different varieties (mean value of Lord Suffield 5 mg./100 g., as against 23 mg./100 g. for Bramley's Seedling). (2) Considerable variation in ascorbic acid content occurs from one year to another. Of 46 varieties analysed 30 had the

highest content in 1944, 11 in 1945, and 5 in 1943. The summer in 1944 was the coolest and wettest. Other data recorded for 1947 also emphasize the relationship between a cool, wet summer and high vitamin C content. (3) Triploid varieties, with the exception of Gravenstein, have relatively high contents, but some diploid varieties, such as Transparente Blanche, are also high in vitamin C. (4) Ascorbic acid loss in storage and ascorbic acid content at different degrees of ripeness are tabulated. (5) Apples with an intense red colour generally have a higher content than paler fruits. (6) A comparison of analyses of fruits grown at latitudes ranging from 59° 40′ to 66° 00′ showed that ascorbic acid generally increases with latitude. Figures for Transparente Blanche did not correspond to this trend, but it is assumed that this early variety of poor keeping quality lost much of its vitamin C content between picking in the north and analysis in the south. (7) No relationship was found to exist between either fruit size or seed colour and ascorbic acid content.

2230. HUELIN, F. E., AND GALLOP, R. A.
Studies in the natural coating of apples. I. Preparation and properties of fractions.
Aust. J. sci. Res., Ser. B, biol. Sci., 1951, **4**: 526-32, bibl. 8, illus.

Working mainly with the Granny Smith variety, the various fractions were best extracted either from whole apples with boiling light petroleum (for oil and wax) or from separated skin with ether after previous extraction with light petroleum (for wax, ursolic acid and "cutin" fractions); the skin was separated from peelings by use of an ammonium oxalate and oxalic acid solution. Details are given of the preparation, properties and quantitative determination of the various fractions, and their distribution in the cuticle and epidermis is discussed. A.C.S.

2231. HUELIN, F. E., AND GALLOP, R. A.
Studies in the natural coating of apples. II. Changes in the fractions during storage.
Aust. J. sci. Res., Ser. B, biol. Sci., 1951, **4**: 533-43, bibl. 5.

The oil fraction of the natural coating of Granny Smith apples increased during storage and reached a maximum at 3-4 times its original concentration. The increase was reduced by "gas" storage (in 5% CO_2, 16% O_2). Later pickings had a higher oil content. The iodine number of the oil increased with increasing concentration. Smaller increases occurred in the wax, ursolic acid, and "cutin" fractions after prolonged storage. The fatty esters of the oil fraction were produced most rapidly at the beginning of storage. Subsequently the production of these non-volatile esters declined, while the rate of volatile ester production increased. There was no definite correlation between the oil content and the resistance of the skin to gaseous diffusion, although both increased during storage. [Authors' summary.]

2232. THOMPSON, A. R.
Volatile products of apples. 1. Identification of acids and alcohols.
Aust. J. sci. Res., Ser. B, biol. Sci., 1951, **4**: 283-92, bibl. 14, illus.

The volatile substances given off to the air by Granny Smith apples at 20° C. were condensed at low temperature. The acids obtained on saponification were found to be virtually free from carbonyl, hydroxy, or unsaturated groups. By conversion to hydroxamic acids followed by chromatographic separation on paper they were identified as formic, acetic, propionic, butyric (probably normal), valeric, and caproic acids. All these acids were shown to be present in the esterified form. Formic and acetic acids were shown to occur in both the free and esterified forms. All these acids do not necessarily occur in every sample of volatiles. For instance, formic acid has been found in some samples but not in others. The alcohols obtained on saponification were found to be predominantly primary and saturated and the major constituents were found to be methanol, ethanol, and *n*-propanol. Ethanol and *n*-propanol were identified by paper chromatography after conversion to hydroxamic acids and methanol by a specific colour test. [Author's summary.]

2233. THOMPSON, A. R., AND HUELIN, F. E.
Volatile products of apples. II. Production of volatile esters by Granny Smith apples.
Aust. J. sci. Res., Ser. B, biol. Sci., 1951, **4**: 544-53, bibl. 11.

Granny Smith apples were stored at 0° C., and samples were removed at intervals for determination of volatile ester production at 20° C. In early removals ester production at 20° C. increased to a maximum and then decreased. In later removals the increase was much less and finally became negligible. Ester production at 0° C. appeared to increase steadily. Early picking reduced ester production and a higher rate of air flow increased it. Reducing the oxygen concentration to 6% first increased and then decreased ester production in comparison with air. The metabolic significance of the results is discussed. [Authors' summary.] It is noteworthy that the theory that volatile esters are directly concerned with superficial scalds is not supported by the lower ester production with early pickings, which are more liable to this disorder; laboratory experiments with synthetic esters have also not supported this theory.

2234. MOYLS, A. W.
Fresh and processed apricots as a source of vitamin A.
Sci. Agric., 1951, **31**: 546-52, bibl. 22.

British Columbia apricots compare very favourably in carotene content with fruit grown in other areas. The varieties English Moorpark, Blenheim, Tilton and Perfection are an excellent source of provitamin A; the varieties Kaleden and Wenatchee Moorpark have a lower carotene content but are still a good source of the provitamin. Twenty-one per cent. of the Wenatchee Moorpark variety was in the "excellent" group, and the rest classified as good. Carotene is not readily destroyed during processing, but commercial canning and hot solid packing of apricots with subsequent storage may reduce it considerably. Canned apricots should retain from 66 to 98% and apricot purée about 50% of the carotene originally present in the fresh fruit.—Exp. Stat., Summerland, B.C.

2235. PEYNAUD, E.
Sur la composition des pêches. **(The chemical composition of peaches.)**
Ann. agron. Sér A, 1951, **1**: 775-91, bibl. 16.
The detailed chemical composition was determined during 1946-1949 of 36 varieties of peach grown in the experimental orchard at Villenave d'Ornon on the southern outskirts of Bordeaux. The studies were concerned with 1. organic acids, 2. nitrogen-containing materials, 3. polyphenols, 4. ascorbic acid (vitamin C), 5. pectic substances, 6. effect of seasonal climatic conditions, and 7. the ripening of peaches.

2236. PEYNAUD, E.
Sur la composition chimique des prunes. **(The composition of plums.)**
Ann. agron. Sér. A, 1951, **2**: 51-6, bibl. 8.
For the first time a detailed study has been made of the composition of a wide range of plum varieties harvested in four successive years. The tabulated data show a great diversity in composition. Fruits of the species *Prunus domestica* were found to be much less homogeneous in this respect than peaches. In the course of the investigation unknown organic acids were encountered which, it is hoped, may be identified later.—Faculté des Sciences, Bordeaux.

Noted.

2237.

a BATJER, L. P., AND ROGERS, B. L.
Chemical thinning of stone fruits.
Proc. 47th annu. Mtg Wash. St. hort. Ass. 1951, pp. 115-19.
Materials used and results obtained at Wenatchee, Wash.

b BENSON, N. R., AND BULLOCK, R. M.
Urea sprays for fruit tree fertilization.
Proc. 47th annu. Mtg Wash. St. hort. Ass. 1951, pp. 113-14.
Suggested programmes for apples.

c BOLSTAD, E.
Litt om fruktdyrking i våre ytre kyststrøk. **(Fruit growing in the coastal areas [of Norway].)**
Frukt og Baer, 1951, **4**: 107-11.
Meteorology discussed in relation to fruit growing.

d BORGSTRÖM, G.
Gaslagring av frukt och bär. **(The gas storage of top and berry fruits.)** [English summary 13 lines.]
J. roy. Swedish Acad. Agric., 1951, **90**: 49-69, bibl. 127.

e CALMARZA FÉLEZ, J.
La vecería y el cultivo racional del olivo. **(Irregular bearing and a rational cultivation of olives.)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 141-6.

f CHARLEY, V. L. S.
Sources, production and distribution of pectin.
Chem. Ind. Lond., 1951, No. 21, pp. 394-400, bibl. 19, illus.
Apple, citrus and sisal residues among others.

g GAGNIEU, A.
Production de pollen chez le pommier: possibilité de léthalite génique monofactorielle. **(Pollen production in cultivated apples. The possibility of monogenic lethality.)** [English summary 17 lines.]
Ann. Amél. Plantes, 1951, **1**: 455-96, bibl. 60.
Pollen viability in 272 varieties.

h GERBER, H., AND KESSLER, H.
Die Gefrierkonservierung von Aprikosen. **(Quick freezing of apricots.)** [French summary ½ p.]
Reprinted from *Mitt. Lebensm. Hyg., Bern*, 1949, **40**: 342-51, bibl. 10, illus. [received 1952].
Wädenswil work shows apricots to be very suitable.

i GUILBERT, H. R., AND WEIR, W. C.
Pear pulp and pear molasses.
Calif. Agric., 1951, **5**: 11: 6, 10, 12.
As feed for livestock.

j LØKEN, A.
Pollenførende insekter og klimaets innvirkning på trekket. **(The influence of climate on the flight of pollinating insects.)**
Frukt og Baer, 1951, **4**: 112-14.

k V.D.MEER, K.
Yields of some apple varieties as affected by the soil profile.
Tijdschr. ned. Heide Maatsch., 1950, **61**: 292-5, from title in *Landbouwk. Tijdschr.*, 1951, **63**: 424.

l PALMER, R. C.
Tree fruits in British Columbia.
Proc. 47th annu. Mtg Wash. St. hort. Ass. 1951, pp. 87-9.
Contains details of acreages and varieties.

SMALL FRUITS, VINES AND NUTS

Small fruits.

(*See also* 2070, 2080, 2126, 2146, 2147, 2237d, 2275a-f, 2919, 3192.)

2238. Break, R. A.
Boysenberry fertilization.
Calif. Agric., 1951, **5**: 11: 5, illus.
Results from a demonstration plot in Fresno County, Calif., suggest that boysenberries are likely to respond to high N manuring but not to P or K.

2239. Wood, C. A.
Raspberry varieties in Great Britain.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 82-92, bibl. 19, illus.
Following a brief discussion on the characters desired in modern raspberries and those used in varietal identification, the author gives descriptions, with a table of diagnostic characters, of the 11 most important commercial varieties grown in Great Britain, together with notes on certain older varieties and on new " hybrid " raspberries.

2240. Morgan, C. N.
Strawberry culture.
Qd agric. J., 1951, **73**: 327-37, illus.
The strawberry is grown in Queensland from the New South Wales border to the far north, but the main producing districts lie within 150 miles north and 50 miles south of Brisbane. Notes are given on varieties including two local selections, Phenomenal and Aurie, location and soil, land preparation, manuring, establishing the crop (planting material, planting—particularly with regard to spacing), management in the field (irrigation, mulching), and harvesting. Strawberries are grown in Queensland as an annual crop and only rarely does the parent plant remain in the ground for a second year; this is because of the difficulty of controlling weeds during the wet summer months, and also because the 2nd year fruit is inferior in size or quality.

2241. Anon.
Illuminating strawberry beds.
Fruitgrower, 1952, No. 2936, p. 631, illus.
Trials by a grower in Cornwall indicated that cloche-reared strawberries receiving both soil heating and artificial illumination were 10-14 days ahead of those with soil heating alone, while the latter appeared to be about 14-21 days ahead of unheated plants. Plants receiving both light and heat flowered before leafing and carried more blooms. It is doubted, however, whether the technique is economical.

2242. Sironval, C.
La méthode de l'utilisation de la forme des feuilles comme mesure de l'avancement du développement chez le fraisier des quatre-saisons. **(A method of using leaf form as a measure of the developmental progress of the everbearing strawberry.)**
C.R. Rech. I.R.S.I.A. No. 6: Trav. Centre Rech. Hormones vég. (*1949-50*), 1952, pp. 120-6, bibl. 3.
The relationship between the position of the leaf on the stem of the everbearing strawberry and its number of teeth was studied, and the results are recorded graphically. It is concluded that by the use of such a graph the stage of development of the plant can be calculated. The moment at which it will flower or its ultimate failure to flower can be anticipated. The age of the seed will also be reflected in the graph, as plants from old seed reach the flowering stage more slowly than those from fresh seed.

Vines.

(*See also* 2194, 2920-2922, 3021c, 3190, 3206, 3207, 3231, 3233.)

2243. Hannigan, M. A.
The grape.
Qd agric. J., 1951, **73**: 257-79, illus.
This article is a revision of an advisory pamphlet written by the late F. A. L. Jardine and published in 1939 [*H.A.*, 9: 1195].

2244. Albertario, P.
Prospettive della viticoltura italiana. **(The future of Italian viticulture.)**
Ital. agric., 1951, **88**: 617-24+15 pp. statistics.
A gloomy account is given, well supported by figures, of the present state of Italian viticulture. While more and more wine is being produced and the menace of phylloxera is being overcome by replanting on American rootstocks, the taste of the public shows a tendency to forsake wine in favour of beer and mineral waters even despite their high price, and at the same time lack of available money prevents even the normal indulgence in wine of former days. Moreover, costs of production have gone up enormously so that wine can only be produced at a loss or at so low a return as to make it not worth while. Meantime the individual consumer is becoming more and more suspicious of what he is drinking, of its consistency, cleanliness and origin. Since some vinegrowers are indifferent, many a potential customer is lost permanently. The time is ripe for combined action by vinegrowers and wine-makers in conjunction with strict regulative action by the government. Figures of production of wines and of the costs of establishment and maintenance of vineyards are given for the main wine producing districts of Italy. The costs of production of wine are compared with the prices received and in many cases cost exceeds price received. Similar conditions in France are cited. The article might well form the basis of an unprejudiced enquiry.

2245. Blaha, J., and Štefka, F.
Vlastnosti plodů (uvologický rozbor)—indikátor praktické použitelnosti odrůd révy vinné. **(Fruit characteristics—as a guide to the value of vine varieties.)** [French and Russian summaries 14 lines each.]
Sborn. čsl. Akad. Zeměd., 1951, **24**: 268-76, bibl. 2.
Biometrical data are given on the most important Czechoslovakian grape varieties, 10 dessert types and 12 wine varieties. It is claimed that the analysis of

these data provides a more satisfactory indication of economic value than existing methods of evaluation.

2246. HENGL, R.
Über das Veredeln von Weinreben. **(Vine grafting.)** [English and French summaries 10 lines each.]
Mitt. Klosterneuburg, 1952, **2**: 50-9, illus.
Results of experiments with over 50,000 grafts have shown the gill cut [a series of interlocking teeth cut in stock and scion] to be the most satisfactory type of cut for grafting. With the aid of a specially constructed cutting machine, operated by a small electric motor, 22,000 grafts can be completed in a day.

2247. MIŠURENKO, A. G.
New temperature management for the stratification of grafts. [Russian.]
Vinodelie i Vinogradarstvo, 1952, No. 2, pp. 30-3, bibl. 2, illus.
High temperatures of 25°-30° C., while most favourable for the graft union of vines, cause excessive callous formation on the basal part of the rootstock and inhibit rooting. Grafts stratified in such a manner that the temperature round the union is maintained at 24°-26° C. and at the base at 14°-18° C. are shown to give a considerably higher percentage of planting material than those stratified the usual way, i.e. at even temperature. The best method for obtaining these differential temperatures is sprinkling the floor, preferably concrete, of frames with very cold water or ice.

2248. COLLET, B.
Comportement des porte-greffes employés en Tunisie pour la reconstitution du vignoble. **(The behaviour of rootstocks used in Tunisia for the restoration of vineyards.)**
Progr. agric. vitic., 1952, **137**: 149-55.
Since 1936, when phylloxera was found to be a limiting factor, the restoration of Tunisian vineyards has occured in three stages: (1) the beginning of the restoration with the predominance of forms of Rupestris du Lot and of 41 B. rootstocks, (2) a transitional period during which Sicilian hybrids were developed, and (3) the present period in which 140 R takes a more and more important place, while R 99 retains its position. The various rootstocks now used are described and tabulated in relation to types of soil and to low or normal rainfall.

2249. MOROZOVA, G. S.
The propagation of phylloxera resistant rootstocks. [Russian.]
Vinodelie i Vinogradarstvo, 1952, No. 2, pp. 52-5, illus.
Phylloxera resistant rootstocks are usually produced in the southern parts of Russia. In the Ukraine and Moldavia the mother plants are grown with 8-12 shoots, in Georgia with 20-30. Recommendations are made for fertilizer applications in the respective areas, and for soil cultivation with a view to moisture retention. The vines are trained as espaliers. The different types used are illustrated.

2250. HARMON, F. N., AND SNYDER, E.
Effects of high temperatures on Sultanina grape on four rootstocks.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 91-4, bibl. 1, illus.
Maximum temperatures of 101 to 113° F. accompanied by average humidities of 24 to 35% during 11 days in late June and early July 1950 in the San Joaquin valley, California, caused fruit losses in Sultanina (Thompson Seedless) grapes ranging from 0 to 100% and also some leaf injury. Records showed that the stronger growing Sultanina vines on Dog Ridge and Solonis × Othello No. 1613 rootstocks suffered less injury than those on their own roots or on Rupestris St. George stock. A correlation of $-0{\cdot}48 \pm 0{\cdot}049$ existed between fruit injury and weight of prunings.

2251. SRIVASTAVA, J. G.
On aerial roots in *Vitis quadrangularis* Wall.
Curr. Sci., 1951, **20**: 133, bibl. 5.
Aerial roots produced by both young and old stems of *V. quadrangularis* during the rainy season are described. They arose from the pericycle between the vascular bundles or from secondary medullary rays where secondary growth had started and not, as usually happens, from the secondary phloem.

2252. TJUTJUNIK, A. F.
The development of overwintering vine buds in the central zone of U.S.S.R. [Russian.]
Vinodelie i Vinogradarstvo, 1952, No. 1, pp. 42-5, illus.
Examinations of 10 vine varieties have shown that the time of bud initiation and differentiation varied between varieties grown under similar conditions. Thus in the variety Northern White the bud initiation of the first inflorescence took place in 1950 on the 1 June and its differentiation on 1 July, while in Early Malengr the comparative dates were 10 July and 8 August. The buds were also observed to be initiated and develop along the shoots at different times. Those growing in approximately the middle of the shoots develop during the most favourable period and are the most vigorous. Recommendations are made as to the number of buds to which each of the 10 varieties discussed should be pruned in the central vine growing areas.

2253. STEINGRUBER, P., AND MÜLLNER, L.
Zum Thema Hochkultur. **(Training vines on a high trellis.)** [English and French summaries 8 and 10 lines.]
Mitt. Klosterneuburg, 1952, **2**: 45-9, bibl. 5.
The authors review recent work in central Europe on training vines on a high trellis with special reference to L. Moser's experiments. [See also *H.A.*, 22: 231 and 2257.]

2254. MAKAROV-KOŽUHOV, L. N.
A new method of training grape vines. [Russian.]
Sad i Ogorod, 1952, No. 3, pp. 32-4, illus.
The "hanging cordon" method described is one in which the stem is grown upright for 130 cm., then bent horizontally and suspended securely but freely from a wire, with laterals trained right and left. Data tabulated show lower yields than from the conventional cordon method under the conditions of the trial, but the hanging cordon is said to have certain advantages: (1) the horizontal stem sways from side to side and so is less liable to injury from strong winds, (2) downy mildew starts to develop later in the season and is less severe than on ordinarily trained vines, (3) rain is more easily thrown off and there is thus less liability to grey

mould infection, and (4) cultural operations are more easily carried out.

2255. Stenuit, D., and Piot, R.
Influence du type de sol sur la viticulture sous verre. **(The effect of soil type on vine production under glass.)**
Trans. 4th int. Congr. Soil Sci., Amsterdam, 1950, Vol. III, pp. 156-61, illus.

A study was made of the effect of soil factors on the growth and production of vines under glass in the district south of Brussels. On sandy soils the proportion of houses producing yields below average was 76%, and of those producing yields above average was only 6%, while on silty soils the proportions were 18 and 41% respectively. Notes are given on the comparative value for vine growing of 7 soil profiles found in that district.

2256. Stenuit, D.
Recherches en viticulture sous verre. Quelques aspects concernant la situation nutritive du sol. **(Studies on viticulture under glass. The nutrient status of the soil.)**
Trans. 4th int. Congr. Soil Sci., Amsterdam, 1950, Vol. III, pp. 105-10.

Some findings of an extensive survey of vinery soils in the Hoeilaert-Overysse district of Belgium are briefly summarized. A high concentration of salts, an excess of chlorine and boron and a deficiency of magnesium were among the factors found to be causing trouble. It is concluded that the normal soil analyses (of pH, phosphoric acid, potash, humus, and nitrogen) are inadequate.

2257. Moser, L.
Die Grashochkultur. **(Vine growing under grass.)**
Schweiz. Z. Obst- u. Weinb., 1952, **61**: 114-17, illus.

The author describes his own method of vineyard management in Austria, in which the vines are trained to a greater height than usual [see *H.A.*, 22: 231 and 2253] to allow the growth of a grass sward. The grass is treated with complete fertilizer in the winter, is mowed 2-3 times in season, and the swath is left *in situ*. In addition to its marked anti-erosion value, this method is labour-saving, but is recommended only for established vineyards on fertile soils.

2258. Filipenko, I. M.
The foliage application of nutrients in vineyards. [Russian.]
Vinodelie i Vinogradarstvo, 1952, No. 2, pp. 34-5, bibl. 1.

NPK fertilizer at 1·6 : 1·8 : 1·4 ratio applied in a 2% concentration, in conjunction with bordeaux sprays to control mildew, was found an effective form of fertilizer application, and improved both the quality and quantity of grapes harvested. The addition of 0·02% boron increased the effectiveness of the spray, that of 0·06% manganese reduced it. Two treatments were made, one before flowering on 4 May, the other on 2 July.

2259. Hopper, H. A., and Forsberg, C. M.
Artificial rain makes a vineyard thrive.
Soil Conserv., 1950, **15**: 195-8, from abstr. in *Turrialba*, 1951, **1**: 256.

Sprinkler irrigation is now considered better than furrow irrigation for vineyards. It avoids the danger of erosion, costs a third of the amount and uses less water. No increase in incidence of pests and diseases has been observed in sprinkler irrigated vineyards.

2260. Weaver, R. J., and Williams, W. O.
Response of certain varieties of grapes to plant growth-regulators.
Bot. Gaz., 1951, **113**: 75-85, bibl. 4, illus.

In one experiment 15 growth regulators were separately applied to Black Corinth grapes by dipping the flower clusters at full bloom. Applications of 4-chlorophenoxyacetic acid, alpha-(1-naphthoxy)-propionic acid, 2,3,5-triiodobenzoic acid, N-2-chlorophenylphthalamic acid, N-1-naphthylphthalamic acid, and N-phenylphthalimide resulted in well-filled clusters, but many berries contained seeds. In a second experiment clusters of Black Corinth were dipped at full bloom or 4 days later into formulations of beta-naphthoxypropionic acid or 4-chlorophenoxyacetic acid. Satisfactory clusters did not develop after treatment with the former compound, but treatment with the latter compound at 10, 50 or 100 p.p.m. resulted in large, compact clusters, the weight increasing with concentration of the acid. Clusters dipped at the post blossom stage were heavier and the berries contained fewer seeds than those dipped at full bloom. When Black Corinth vines were sprayed at full bloom with 4-chlorophenoxyacetic acid at 25 p.p.m. many large clusters developed. Average weight of fruit per vine for ungirdled but sprayed, girdled but unsprayed, and ungirdled and unsprayed plants was 17·3, 22·4 and 1·8 lb. respectively Results are also reported of growth substance applications to varieties White Corinth, Black Monukka, Sultana, Thompson Seedless, Muscat of Alexandria and Hunisia. Applications to varieties containing seeds resulted in no apparent enlargement of berries.

2261. Benvegnin, L.
De l'influence du prélèvement de raisin de table sur la qualité du moût. **(The influence of selective picking of table grapes on the must quality of the remaining crop.)**
Rev. romande Agric. Vitic., 1952, **8**: 24.

Experiments carried out in Switzerland in 1951 confirmed the results obtained in the previous year [see *H.A.*, 21: 1425], i.e. that the picking of selected bunches for table grapes about a fortnight before the main harvest had no detrimental effect on the quality of the must, and even increased the maturity, of the remaining crop.

2262. Fanelli, L.
Il sistema Thomery di conservazione dell' uva. **(The Thomery system of table grape preservation.)**
Ital. agric., 1951, **88**: 591-5, illus.

The author just touches on the system of growing table vines against walls with overhead glass protection at Thomery and a few other centres in France and then describes in detail the method of preservation adopted. Briefly it consists of scaffolds subjected to not very exact conditions of temperature and humidity on which are fixed glass vessels. The bunches are cut with 1 or 2 nodes when adequate maturity is reached and the

stems are inserted in one of the water containers. They will then store perfectly until the spring. For best results the following arrangements are recommended: a fruit room well aerated but with a temperature of 5-6° C. and on no account to exceed 12° C. The interior walls and floor should be smooth and easily cleaned. Humidity should vary between 75 and 90%. If it becomes excessive recourse must be had to quick lime. A few fumigations are desirable. The rows in the scaffolding should be 25 to 30 cm. apart and the water containers about 15 cm. apart in the rows. Each cylindrical container, which may be glass or metal, should receive initially a piece of carbon and 5% of cooking salt in the water. The neck should be closed to check evaporation. At frequent inspections any faulty grapes are removed. On marketing the grapes are cleaned and packed with the piece of stem attached.

2263. Foytik, J.
[Marketing] Thompson Seedless grapes.
Calif. Agric., 1951, **5**: 12: 2.
Marketing costs within the state of California are analysed. Of the price paid by the consumer 35% goes to the grower to cover production, harvesting and field packing. The rest goes in approximately equal parts to the retailer and for distributing charges such as packing, transport and wholesaling.

2264. Siddappa, G. S., and Ishaq, M.
Canning of grapes in Baluchistan.
Indian J. agric. Sci., 1950, (issued 1951), **20**: 101-6, bibl. 4.
In trials at Quetta the small seedless variety Kishmish and the larger seeded variety Haitha gave good canned products, though there was a tendency for fruits of the latter to split in the can. The methods used and costs of production are indicated.

2265. Anstett, A.
Essais de fabrication de fumier artificiel de sarments de vigne. **(Experiments in the making of compost from vine prunings.)**
Ann. Inst. agric. Algér., 1951, **6**: 1: 1-45, bibl. 17.
La fabrication du fumier artificiel à partir des sarments de vigne. **(Compost from vine shoots.)**
Summarized from *Elévage et Cult.* in *Terre maroc.* 1952, **26**: 33-5.
The production of humus from vine shoots is easy. The humidity of the fermenting mass should be about 75%. The addition of 5-7 kg. of nitrogen per 1,000 kg. of dry shoots is sufficient, more nitrogen being prejudicial to humification. The nitrogen should be added in quantities not exceeding 3 kg. N per 1,000 kg. shoots at a time. The addition of potash is not necessary but soluble phosphates may be recommended. The humus produced may be used after 4 to 5 months of humification without any harmful effect on crops. The manure from vine shoots has a chemical composition similar to that of farmyard manure. One ton of shoots yields 1·5 tons of manure with 80% moisture. The economics of the process depend on the amount of manure produced. With material from 30-40ha. of vines, the operation is economically sound.

2266. Meissonnier, F.
Le sarment de vigne: source d'humus et d'engrais. **(Vine shoots as a source of humus and fertilizer.)**
La Potasse, Jan. 1952, No. 191, reprinted in *Progr. agric. vitic.*, 1952, **137**: 185-8.
A method is described of utilizing the vine shoots that are normally pruned away when the first winter frosts cause the leaves to fall. The shoots are conveyed to a distillery and treated in such a way that methane is given off and stored in gas cylinders for heating purposes, while the residue makes excellent compost.

Nuts.

(*See also* 2048.)

2267. Kurokami, T., and Takematsu, T.
Studies on the development of keeping quality of chestnut fruits by delaying their germination with phytohormone treatments (3). [Japanese with English summary 9 lines.]
Tech. Bull. Kagawa agric. Coll., 1950, **1**: 3: 82-9, bibl. 13.
2,4-D was cheaper and more effective than NAA in delaying the germination of chestnuts. Root growth was inhibited until April when the seeds were kept in hormone-treated sawdust.

2268. Leroy, J.-F.
Le pacanier [*Carya illinoensis* (Wang.) K. Koch]: Morpho-biologie florale. Fructification. I and II. **(The pecan, *Carya illinoensis*: Its floral morphology and biology and fruiting. I and II.)**
Fruits d'Outre Mer, 1951, **6**: 6-14, and 267-79, bibl. 30, illus.
In the first part of this detailed and well illustrated review of the literature [noted in *H.A.*, 22: 250f] the author is concerned primarily with the biology of the developing buds and inflorescences. He goes fully into the morphology of the inflorescences of *Carya* and closely related species and compares the development of the buds of the pecan with those of *Juglans*. The second part is devoted to studies on the differentiation and development of the female and male flowers and their internal characters, on pollination and fertilization, and on the development of the fruit, including the growth of the albumen and the embryo, and changes in the chemical composition of the fruit up to maturity. In conclusion the practical value of the knowledge gained from these studies is discussed.

2269. Harrison, S. G.
Edible pine kernels.
Kew Bull., 1951 (issued 1952), No. 3, pp. 371-5, bibl. 6.
Some 18 species of *Pinus* produce seeds which are large enough and of sufficiently attractive flavour to be considered edible. The more important of these are *P. pinea, P. cembra, P. gerardiana* and *P. cembroides*. Their distribution and the methods used in collecting and processing their kernels are described. Several other North American species are mentioned briefly.

2270. ANON.
Essais entrepris par le jardin du Hamma sur les semis de *Pistacia vera* (pistachier vrai). **(Trials with seeds of *Pistacia vera* (the pistachio).)**
Rev. hort. Algér., 1950, **54**: 356-7.
The results of trials carried out at the Hamma experimental garden show that the best time for sowing pistachio seeds is in March, and that treatment with Sanigran (an organic mercury preparation) as well as soil disinfection are useless.

2271. BROOKS, M. G.
Effect of black walnut trees and their products on other vegetation.
Bull. W. Va agric. Exp. Stat. **347**, 1951, pp. 31, bibl. 16.
Field studies have been carried out since 1939 on 300 black walnut trees (*Juglans nigra*) in West Virginia, Virginia, Maryland, Ohio and Michigan to determine the effect of the trees on the surrounding vegetation. Data are recorded on the occurrence and growth of a large number of woody and herbaceous species within circles of a 60 ft. radius surrounding the trees. Apparent antagonisms were observed between black walnut trees and apple, potato, tomato, alfalfa, blackberry, heath and some other plants. Evidence indicates that actual contact with the walnut roots is necessary before associated plants are harmed. The effect of black walnut in raising the pH of the soil in which it is growing and in improving pasture land is noted. These studies show that there can be little doubt that the roots of black walnut produce a substance or substances that are toxic to certain other plants, although the nature of the toxic substance was not investigated. The relevant literature is reviewed throughout the paper.

2272. SORBER, D. G.
Hull-loosening process improves walnut kernels.
Res. Achiev. Sheet U.S. Dep. Agric. **R.A.S. 151**(C), 1952, pp. 2, bibl. 4.
Describes the ethylene gas treatment of walnut hulls in the green sticktight condition, worked out by the Laboratory of Fruit and Vegetable Chemistry, California in 1933-35.

2273. DAGLISH, C.
The occurrence of ascorbic acid in the walnut (*Juglans regia*)
Biochem. J., 1951, **49**: 639-42, bibl. 7.
A spectrophotometric assay for ascorbic acid and dehydroascorbic acid has been applied to extracts prepared from various parts of the walnut (*Juglans regia*). Definite seasonal variations have been found for the concentration and amount per unit of these substances. In order to explain the high concentration of ascorbic acid in the endocarp, which appears to preclude its translocation as such from the other parts of the plant, it is suggested that dehydroascorbic acid may be utilized by this tissue. [Author's summary.]

2274. DAGLISH, C.
The spectrophotometric determination of ascorbic acid in tissue extracts, particularly those of the walnut (*Juglans regia*).
Biochem. J., 1951, **49**: 635-9, bibl. 10.
The absorption characteristics of ascorbic acid as affected by pH have been determined. A method of assay utilizing the shift of the absorption curve has been suggested. The results of this method when applied to walnut extracts have been compared with those obtained by the indophenol dye titration. [Author's summary.]

Noted.

2275.

a COX, J. A., AND WILSON, W. F., JR.
Louisiana strawberries.
Ext. Publ. La Div. agric. Ext. **1096**, revised 1951, pp. 16.

b FILINGER, G. A.
Growing bush fruits in Kansas.
Circ. Kans. agric. Exp. Stat. **275** [being *Circ.* 239 revised], 1951, pp. 32, illus.

c KENNARD, W. C., TUKEY, L. D., AND WHITE, D. G.
Further studies with maleic hydrazide to delay blossoming of fruits.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 26-32, bibl. 4, being *Pap. J. Ser. Pa agric. Exp. Stat.* **1664**.
Same information as that given in *Progr. Rep. Pa agric. Exp. Stat.* **52**, 1951, for which see *H.A.*, 21: 3317 [Small and top fruits].

d LATIMER, L. P.
Cane fruit culture.
Ext. Circ. N.H. agric. Ext. Serv. **289**, 1948, pp. 8, illus. [received 1952].
Raspberries and blackberries in New Hampshire.

e MINISTRY OF AGRICULTURE.
The preparation of strawberries for market.
Adv. Leafl. Minist. Agric. Lond. **391**, 1952, pp. 8, illus.

f RANDHAWA, G. S., AND SINGH, D.
Strawberry culture in India.
Indian J. Hort., 1951, **8**: 4: 49-53, bibl. 11.

g SRIVASTAVA, J. G.
On a new type of anomalous secondary growth found in the stem of *Vitis quadrangularis* Wall.
Curr. Sci., 1951, **20**: 133, bibl. 2.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(*See also* 2034, 2452o, q, Weeds and weed control section, 3182, 3183, 3204, 3225, 3227, 3250.)

2276. TUNSTALL, A. C. (Editor).
International Conference "Some crop protection problems in world conference", 26-28 June 1951, Fernhurst Research Station, nr. Haslemere, Surrey.
Plant Protection Ltd., 1952, pp. 116, illus.

This report consists of six reviews, by various authors, with discussions, on subjects pertaining to the protection of agricultural and horticultural crops, as follows:
Sir John Russell: "Wastage of world food supplies through pests and diseases."
W. G. Templeman: "Chemical weed control."
J. H. Stapley: "Synthetic organic insecticides, their value and limitations."
J. F. H. Cronshey: "Fungicides, their development and uses."
K. M. Smith: "Control of virus diseases."
E. Holmes: "Factors limiting crop protection progress."

2277. RIPPER, W. E., AND OTHERS.
Pest control farmers' handbook.
Pest Control Limited, Cambridge, 1952, pp. 104, illus.

This loose leaf brochure contains useful information on the control of pests, diseases and weeds in field, garden, orchard and glasshouse crops. There are many illustrations, some of them coloured, and programmes for the winter spraying of orchards and soft fruits using DN 289, and for spring spraying with various preparations. Reference to work overseas includes mention of the systemic insecticide Hanane against the mealy bug vector of swollen shoot of cacao.

2278. TIRELLI, M., AND SANTINI, L.
Varietà di piante coltivate in Italia resistenti a malattie e a cause avverse. **(Varieties of plants cultivated in Italy which are resistant to diseases and adverse circumstances.)**
Boll. Staz. Pat. veg. Roma, 1949 (issued 1951), **7**: 217-68, bibl. 34.

A general discussion on the control of plant diseases is followed by lists of varieties of crop plants with their reaction to various diseases, and with references to authors recording them, under: I. European and American grapevines and their hybrids, II. Olive (*Olea europaea*), III. Fruit trees (apple, pear, orange, chestnut, cherry, peach, plum, hazel nut), IV. Woody plants, V. Wheat, VI. Other cereals, VII. Vegetables (potato, tomato, etc.), VIII. Industrial herbaceous, and ornamental plants (including tobacco)

2279. JACKS, H., AND OTHERS.
Orchard spray trials in 1950-51.
[*Publ.*] *N.Z. Fruitgrs' Fed.*, 1951, 7 pp.

Highly condensed results are given of trials on (1) diseases and pests of apples, (2) diseases of peaches (brown rot, *Sclerotinia fructicola*), (3) diseases of passion fruit (brown-spot, *Alternaria passiflorae*, and grease spot, *Pseudomonas passiflorae*), (4) diseases and pests of citrus (verrucosis, *Elsinoe fawcetti*, and melanose, *Diaporthe citri*, scale insects, aphids, thrips and red-mite, and blossom rot, *Cladosporium fulvum* and *Botrytis cinerea*, (5) pests of boysenberries (blackberry mite, *Aceria essigi*).

2280. INDIAN COUNCIL OF AGRICULTURAL RESEARCH.
List of common names of Indian plant diseases.
Indian J. agric. Sci., 1950 (issued 1951), **20**: 107-42.

Host plants, which include vegetables, fruits and forest trees, are arranged in alphabetical order under their scientific names and in some cases with their Indian names also. Diseases are listed under each by their scientific and common English names.

2281. DU PLESSIS, S. J.
Three important vine diseases.
Sci. Bull. Dep. Agric. S. Afr. **323**, 1951, pp. 30, bibl. 11, illus.

The most important symptoms of bacterial blight (*Erwinia vitivora*), anthracnose (*Gloeosporium ampelophagum*), and dead arm (*Phomopsis viticola*) on the shoots, tendrils, leaf petioles, leaves and bunches of vines are described with the aid of coloured illustrations. The regular occurrence of *E. vitivora* in tissues of blight infected vines is indicated. Lenticular stripy spots on green shoots, leaf petioles and bunch stalks and the stripy leaf spots are some of the most characteristic symptoms of dead-arm. Data are supplied on the composition of vineyards in the most important vine-growing districts of the Western Cape Province. There are indications that the Jaquez variety is still preferred as a rootstock. Many of the most popular vine varieties are those which are relatively susceptible to the main South African vine diseases.

Disturbances of nutrition or of unknown origin.

(*See also* 2186-2188.)

2282. MULDER, D.
Survey of nutritional diseases in fruit trees in relation to soil conditions in the Netherlands.
Trans. 4th int. Congr. Soil Sci., Amsterdam, 1950, Vol. II, pp. 141-4 [received 1952].

While many mineral deficiencies occur in orchards, only potassium deficiency on the potash fixing river clays and copper deficiency are due to natural conditions. Fertilizer applications are responsible for the others, especially those of magnesium, zinc, iron and manganese. It is suggested that bitter pit of apple, a late season symptom of boron deficiency, is induced by excess nitrogen and dry soil conditions.

2283. MINTON, N. A., HAGLER, T. B., AND BRIGHTWELL, W. T.
Nutrient-element deficiency symptoms of the rabbiteye blueberry.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 115-19, bibl. 5, illus.

Nutrient-element deficiency symptoms on the Walker

variety of rabbiteye blueberry, *Vaccinium ashei*, grown in sand cultures are described, in the order in which they first appeared, for deficiencies of N, S, K, Mg, P, and Ca. Data are tabulated on growth of plants and on the analysis of leaves, stems and roots.

2284. TROCMÉ, S.
Observations sur la carence en magnésium du pommier. **(Observations on magnesium deficiency of apple trees.)**
C.R. Acad. Agric. Fr., 1952, **38**: 49-52, bibl. 2.

Symptoms on apple trees attributed to magnesium deficiency are described. On the older leaves interveinal necroses appear which do not reach the edge of the leaves, at least not at first, and the affected leaves are liable to fall prematurely, in September. The terminal leaves are normal while those in the middle and base of the shoot show the necroses, which are often accompanied by marginal and interveinal chlorosis. The fruits show no abnormal symptoms. Analyses show that the leaves from affected trees have about half the magnesium content of leaves from healthy trees. Four applications of magnesium sulphate solutions at fortnightly intervals in May and June had no noticeable effect during the first year but a repetition of the treatment on the same trees the next year induced a delay in the appearance of symptoms and these were less pronounced than on unsprayed trees.

2285. WOODBRIDGE, C. G., AND MCLARTY, H. R.
Manganese deficiency in peach and apple in British Columbia.
Sci. Agric., 1951, **31**: 435-8, bibl. 15, illus.

A manganese deficiency in the Okanagan area in British Columbia is recorded. Symptoms of moderate deficiency were observed in peach, apple, and apricot. One spray of manganese sulphate, 2 lb. to 100 gal. water, effected complete recovery on peach in 1 month. Manganese content of normal peach leaves averaged 40·9 p.p.m. and affected leaves 9·3 p.p.m.; corresponding figures for apple were 86·8 and 10·8 p.p.m.—Canada Dep. Agric., Summerland, B.C.

2286. HULSHOF, H. J., AND ZEGERS, H. J. M.
Wortelsterfte en slechte bladstand bij peren. **(The death of roots and foliage injury in pear trees.)**
Fruitteelt, 1951, **41**: 758-9, illus.

In the summer of 1951 a serious disorder of pear trees was observed in certain parts of Holland, particularly on river clay soil. An affected tree seemed quite normal until June, when the edges of the leaves began to fold upwards and blackish-brown dead spots appeared towards the leaf margins. These symptoms gradually extended over the whole tree, and the foliage died. The symptoms suggested a lack of water but weather conditions were such that direct dryness could not be the cause, so excavations were made in the orchards and soil profiles examined in relation to the state of the root systems. It was found that unfavourable soil moisture and aeration conditions occurred on two types of soil, one with a heavy impermeable subsoil, the other being a thin light clay soil on loose sand. The above-ground symptoms were associated with root injury. To control this disorder good drainage is essential.

2287. MCKENZIE, D. W.
Black end of pears in New Zealand.
Orchard. N.Z., 1951, **24**: 7: 4-5, illus.

Black end affects the fruit of European pear varieties (*Pyrus communis*) which have been budded or grafted on rootstocks of oriental pear species (*Pyrus serotina, P. ussuriensis, P. betulaefolia*). Up to 20% of pear trees propagated on Keiffer seedling rootstocks have been observed producing fruit thus disfigured. Standard pear trees on seedling roots of *P. communis* (e.g. Williams' Bon Chrétien or Winter Nelis) have never been recorded as affected by black end. Nine scion varieties are listed as being susceptible to black end when worked on oriental pear or Keiffer seedling stocks.

2288. GOIDÀNICH, G.
Deperimenti e mortalità dei peschi in rapporto a necrosi del floema e degenerazione del cambio nella Venezia Giulia. **(Die-back and mortality of peach trees accompanied by a necrosis of the phloem and a degeneration of the cambium in the Venezie Giulia.)** [English summary 1 p.]
Boll. Staz. Pat. veg. Roma, 1947 (issued 1950), **5**: 1-30, bibl. 27, illus.

A die-back of peach trees, seen in Venezie Giulia assumed maximum intensity in 1940-41, and was particularly serious around Udine where many trees died. The first symptoms are that the leaves lose their normal colour and become pale with red stripes, particularly along the veins. The leaves become rolled, almost tubular, and finally wither. Shoots are less vigorous than normal and are chiefly at the apices of the twigs. Depressions arise in the bark and from them gum is exuded. Later the branches die back and during summer the whole crown may be affected. Internal symptoms are a reddish brown discoloration of the inner bark and a degeneration of the cambium, and later gummosis of the xylem. The disorder is not caused by any parasite, and the possible causes are discussed. At present the only recommendation is to remove affected trees as soon as the disease is seen and to note and cultivate any varieties which appear to be resistant.

2289. PLAKIDAS, A. G.
Chlorotic phyllody of strawberry.
Plant Dis. Reptr, 1951, **35**: 495-6, bibl. 1, illus

A disease of strawberry plants was observed in Louisiana in the spring of 1949 and again in 1950. The most prominent symptoms were chlorosis of the foliage and phyllody of the flowers. The colour of the leaves (general chlorosis without any definite pattern) varied from pale-green in some plants to brilliant yellow in others, so brilliant that the affected plants could be seen in a field at a distance. The phyllody, also, showed considerable variation. In some flowers the petals and all the carpels were transformed into miniature leaves, with spindly petioles about ¼ to 1 in. long, forming a loose rosette; in others the petals became green but retained their normal shape, and the carpels enlarged to form stipitate, puffed, bladder-like structures; in still others, a few of the carpels in the centre of the receptacle remained normal in shape and size, but the outer ones, as well as the petals, were phylloid. In the advanced stage of the disease, the

leaves are much reduced in size, with short petioles, and the whole plant assumes a stunted, bright yellow, rosetted appearance. The disease is self eliminating because all the affected plants die with the advent of warm weather, usually about the middle of May. The cause of the disease has not yet been determined. Attempts to transmit it by runner-grafting failed because most of the plants died and the survivors made weak growth unsuitable for grafting. There was no correlation between the disease and any particular set of soil or cultural conditions. Affected plants were found next to normal plants.—Louisiana agric. Exp. Stat., Baton Rouge, Louisiana.

2290. Emiliani, G.
Relazione su di un caso di anomalia di vegetazione riscontrato in un vigneto d'uva da tavola presso Verona. **(A disorder observed in a vineyard of table grapevines near Verona.)**
Boll. Staz. Pat. veg. Roma, 1949 (issued 1951), **7**: 183-91, bibl. 21.

This is a preliminary report of observations in the Adige valley on vines growing in a level alluvial soil, permeable, silico-argillaceous, with a little lime, reaction sub-alkaline, irrigated, low in humus content and assimilable phosphate but well provided with available potash. The variety affected was Regina dei Vignete worked on Riparia × Rupestris 101-14. Plants of the same variety on Goliath rootstocks were not affected. The leaves on diseased vines were smooth and rolled, with waxy epidermis, pale green at the centre of the lea blade and yellowish at the margins, the discoloration sometimes extending over the whole lamina and becoming necrotic. There was marked reduction in the phloem and xylem of the stems, but the root systems were healthy. The possible causes of the trouble are discussed and, on the assumption that soil conditions are at fault, manurial experiments are in progress, including green manuring with crimson clover (*Trifolium incarnatum*).

2291. Baldacci, E., and Fogliani, G.
Una alteración de los olivos de etiología incierta en la región del lago Garda. **(A disorder of unknown origin in olives in the lake Garda district [of Italy].)**
Olearia, 1951, Nos. 9-10, from abstr. in *Bol. Oleic. int.*, 1951, No. 5, p. 67.

The symptoms of a new disease of olives which has appeared in the Lake Garda district are a discoloration of the leaves, followed by leaf fall and desiccation of the branches, and a necrosis of cambium and phloem. It is given the name leptonecrosis of olives. The disease will attack trees of any age, but those 3-15 years old are most susceptible. Young trees die within 3 years. Investigations into the cause of the disease are planned.

Climatic factors.

(*See also* 2052, 2452r, x.)

2292. Ferkl, F.
Výsledky měření teploty v ovocných stromech. **(Results of temperature measurements in fruit trees.)** [English and Russian summaries ¼ p. each.]
Sborn. čsl. Akad. Zeměd., 1951, **24**: 175-81, illus.

Precise measurements of temperatures in the cambium of fruit tree trunks obtained by an electrical apparatus showed on sunny winter and early spring days differences of 20° C. and more between the south and north sides of the trunk. Shading of the stems on the sunny side is recommended in Czechoslovakia to prevent damage due to these variations. For this purpose straw matting and a shield made of a rubberized compound " ruberoid " were found very suitable.

2293. Grasso, V.
Ancora sul deperimento del ciliegio (1948-1951). **(Further notes on a dieback of cherry trees in Italy.)** [English summary 3 lines.]
Not. Mal. Piante, 1951, No. 17, pp. 34-9, bibl. 5.

The distribution and the possible causes of a disease affecting cherry trees in Italy are discussed. The disease is thought to be due to drought together with sun-scald on the trunk.

2294. Chandler, W. H., and Brown, D. S.
Deciduous orchards in California winters.
Circ. Calif. agric. Ext. Serv. **179**, 1951, pp. 38, bibl. 1, illus.

The problem of delayed foliation of fruit plants in California, due to insufficient winter chilling, is discussed. The treatments that can be used to break the rest period are dealt with under exposure to chemicals, pruning, spraying, and breeding tolerant varieties; the effect of such factors as intensity of sunlight, fog, wind and tree condition on the effectiveness of chilling are noted. Data are presented on winter chilling in some parts of California. Finally a summary is given of the chilling requirements of the various deciduous top and soft fruits, including figs, grapes, persimmons, quinces and nuts.

2295. Kemmer, E., and Schulz, F.
Das Frostproblem im Obstbau. I. Der Blütenfrost. **(The frost problem in fruit growing. I. Spring frost.)**
Merkbl. Inst. Obstb. Berlin, **16**, 1952, pp. 19, illus.

The critical temperatures during the different stages of blossoming in apples, pears, cherries, plums, peaches and apricots are given individually. They average −3·5° C. for the closed buds, −1·9° C. at full blossom and −1·5° C. at fruit set. The general conditions conducive to frost damage and methods of prevention are reviewed.

2296. Lewis, F. O.
Low-cost frost protection.
Fruitgrower, 1952, No. 2933, p. 476.

A home-made orchard heater is briefly described, made of an old 5 gal. drum, the fuel used being a mixture of sawdust, sump-oil and gas tar. For 1 acre of soft fruit 50 to 60 such heaters are needed.

2297. Nagy, J.
Frostbekämpfung im Weinbau durch künstliche Beregnung. **(Frost protection in viticulture by sprinkler irrigation.)**
Schweiz. Z. Obst- u. Weinb., 1952, **61**: 85-91, illus.

During trials in Würtemberg, Germany, water sprayed

at the rate of 1 to 2 l. per sq. m. per hour gave good protection of vines from early autumn frosts up to −5° C. and with the variety Riesling harvested 3 weeks after treatment improved the quality of wine. It is thought that a similar treatment would also provide protection against late spring frosts. The apparatus used and the layout of the experiment are described.

2298. PASTINE, L.
Efectos de las bajas temperaturas sobre el olivo. **(The effects of low temperatures on olives.)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 39-40.

In the province of Bari, Italy, temperatures fell to −7° C. during March 1949, following a warm February. The damage sustained in an olive plantation of the varieties Ogliarola and Coratina is recorded. A yellowing of the buds, splitting of the shoots and partial defoliation occurred, Ogliarola being the more severely affected. In this variety only, cankers developed round the buds and in a few cases splitting occurred in the main branches. With Coratina growth developed from secondary buds on young wood in mid-June, but with Ogliarola many of these buds had been cankered and growth developed later from secondary buds on older wood.

2299. CICCARONE, A.
Alterazioni da freddo e da rogna sugli ulivi esemplificate dai danni osservati in alcune zone Pugliesi negli anni 1949-1950. **(The effects of cold and olive knot on olives, as shown by the damage observed in certain parts of Puglia during 1949-1950.)**
Boll. Staz. Pat. veg. Roma, 1948 (issued 1950), **6**: 141-74, bibl. 69, illus.

Italian literature on the behaviour of the olive tree towards frost and olive knot is reviewed. According to the author hyperplasias on the olive in 1949 were caused by (1) the disorganization of the cambium induced by snowfalls in March, (2) the strong N. and N.W. winds at that time which changed the snow into hoar-frost, (3) infections by the olive knot organism, *Pseudomonas savastanoi*, and (4) exceptionally heavy rains in March. The rains induced the plants to leaf out at once and allowed the bacterium to reach the cambium and extend along the internodes, and healing was prevented. It is suggested that in such cases pruning should be done earlier than usual, that the amount of pruning be reduced and that spraying should be carried out immediately after pruning with 1% bordeaux mixture.

2300. FREGOLA, C.
Comportamiento del olivo en las zonas frío-áridas. **(Performance of olives in cold arid districts.)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 41-3, bibl. 3.

The information in the contribution here summarized is based on observations made in Tuscany. Varietal resistance to cold was very marked, Moraiolo being relatively resistant and Correggiolo very susceptible. Most damage from cold occurred on southern and eastern slopes. The average number of flowers per shoot was higher and the amount of abortion less on the branches on the periphery of the tree than on those in the centre; the proportion of fertilized fruits that reached maturity was also greater on the periphery. The significance of this in the choice of pruning methods in cold regions is discussed.

2301. BERRY, F. H.
Winter injury to Asiatic chestnut trees in the south during November 1950.
Plant Dis. Reptr, 1951, **35**: 504-5, bibl. 1, map.

In the southern United States exceptionally high temperatures were recorded during early November 1950 (up to 94° F. in Georgia), followed by a sudden, severe drop at the end of the month (to 0° F. in Georgia). As a result, many Asiatic chestnut plantings were not dormant when the frosts came, and considerable winter injury occurred. The distribution and severity of the injury is recorded on a map. The frost cracks, sometimes more than 7 ft. in length, provided ideal entrances for the chestnut blight fungus (*Endothia parasitica*). Trees of all sizes were injured, but vigorous trees suffered the most. Previous cultural treatments that tended to delay dormancy, such as late cultivation, late pruning or mulching, increased the severity of the damage. Observations are recorded on special cases of resistance or susceptibility in *Castanea mollissima*, *C. seguinii* and *Castanopsis delavayi*.

2302. RUI, D.
La sperimentazione dei razzi antigrandine nel 1950. **(Anti-hail rocket trials [in Italy] in 1950.)**
Atti Accad. ital. Vite, 1950, **2**: 2: 136-68.

An account is given of a one year trial of the use of rockets in 10 provinces of northern Italy. The author summarizes his conclusions from very diverse data. Among them are:
Future work. Experiments should be continued for at least another 5 years under competent and interested agriculturists: these trials should be correlated with one another and superintended by the Ministry. *Material*. The rockets should have been tested before use in anti-hail trials, and should be available through authorized suppliers. Their use should be limited to appropriate occasions. They should be simple in construction and timed to explode at 1,000 and 1,500 metres. Methods of touching them off should be automatic. *Siting*. They should be sited not more than 600-700 metres from one another in a network of supervised posts. Proper liaison with the meteorological stations and a skilled personnel are essential. Professor Marsais of the National Viticultural Research Station of Paris noted that various methods had been adopted in France in the last 50 years to prevent hail damage including the discharge of projectiles from aeroplanes. He pointed out that the chief difficulty of organizing more effective measures is the fact that a hail storm always arrives in a matter of minutes only, that one cannot tell in advance whether it is a hail storm, and, if it is a hail storm, where the hail will actually fall. He therefore favoured cultivation in areas not usually subject to hail damage coupled with adequate insurance as the best policy.

Viruses.

(*See also* 2452j, k, t, z, 2785, 2793e.)

2303. Posnette, A. F., and Cropley, R.
A preliminary report on strains of the apple mosaic virus.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 128-30, bibl. 1, illus.

The transmission of different symptom-types of mosaic by grafting to several apple varieties has demonstrated the existence of three distinct types. Evidence of cross-protection suggests that they are caused by related strains and the names " severe mosaic strain ", " mild vein-banding strain " and " mild mosaic strain " are used. [Authors' summary.]

2304. Cation, D., and Gibson, R. E.
Dwarf fruit and decline of apple, a virus disease.
From abstr. in *Phytopathology*, 1952, **42**: 4.

Grafting operations in two Hyslop crabapple orchards indicated that Jonathan was a masked carrier of a virus, of which Hyslop was a reactive indicator. The virus-carrying Jonathan scions grow normally for several years but then show reduced growth and small fruit. The entire tree gradually declines until it is dead or worthless in 5 to 6 years. Fruit borne on the Hyslop stock branches is dwarfed and deeply lobed or prominently five-ribbed longitudinally.

2305. Mulder, D.
Een virusziekte van appelbomen. (**A virus disease of apple trees.**)
Fruitteelt, 1951, **41**: 737-8, illus.

A disease of apple trees, particularly the Goudreinette variety, in the Zeeland province of Holland, is characterized by a branching or proliferation of the watershoots and an abnormal enlargement of the stipules. As symptoms can be reproduced by grafting it is considered to be caused by a virus and the name " proliferation disease " is suggested.

2306. Posnette, A. F., and Cropley, R.
The rubbery wood virus and apple propagation.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 131-2, bibl. 2, illus.

Using the sensitive variety Lord Lambourne, the presence of rubbery wood virus has been demonstrated in the stoolbeds of the clonal apple rootstocks M.I and M.IX at East Malling. Six out of 12 tested stools of M.I were infected, and 10 out of 12 of M.IX. Tests on M.II, M.III, M.IV, M.VII, M.XII, M.XVI and Crab C from the Research Station beds were negative, but stocks of M.III and M.VIII bought-in from a commercial nursery were entirely infected. The current investigations on the virus-status of rootstocks and scion varieties are discussed. [Authors' summary.]

2307. Biraghi, A.
Su di un' anomalia nella lignificazione di noccioli di albicocca. (**An abnormal lignification in apricot stones.**) [English summary 4 lines.]
Boll. Staz. Pat. veg. Roma, 1949 (issued 1951), **7**: 19-23, bibl. 4, illus.

An abnormal condition found in apricot stones, consisting in the inhibition of lignification of groups of cells, is described. As a result of this condition the stones can easily be perforated. The abnormality bears some resemblance to a virus disease in stone fruits described in Bulgaria, and reference is made to a lack of lignification associated with the " rubbery " condition of certain apple varieties in England.

2308. Cation, D.
Further studies of transmission of ringspot and cherry yellows viruses through seeds.
From abstr. in *Phytopathology*, 1952, **42**: 4.

Seeds collected from two Mahaleb trees infected with cherry yellows were germinated and grown to seedling stage in the greenhouse. Seedlings from one tree showed 41% total virus transmission and those from the other 24%. Each series showed a 2 to 1 ratio of cherry yellows to ringspot. Other observations confirmed the transmission of the viruses through seeds.

2309. Massee, A. M.
Transmission of reversion of black currants.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 162-5, bibl. 4.

Each of 24 normal black currant bushes, artificially infected with blackcurrant gall mites, *Phytoptus ribis*, obtained from reverted bushes, developed symptoms of virus disease in 3 years or sooner. Six untreated control plants remained apparently normal. Attempted transmissions by means of the currant capsid bug, *Lygus pabulinus*, and 4 aphids, *Cryptomyzus ribis*, *Nasonovia ribis-nigri*, *Aphis grossulariae* and *Hyperomyzus lactucae*, gave negative results.

2310. Posnette, A. F.
New virus diseases of *Ribes*.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 133-5, bibl. 6, illus.

The symptoms of 3 new virus diseases of *Ribes* are described. They have been named gooseberry vein-banding, black currant vein-pattern and black currant yellows. Each was transmitted by grafting, and in addition gooseberry vein-banding, which is very prevalent in Kent, was shown to be transmitted by the aphids *Nasonovia ribis-nigri*, *Aphis schneideri* and *A. grossulariae*.

2311. Houtman, G.
Het " verlopen " van kruisbessenstruiken. (**The " degeneration " of gooseberry bushes.**)
Fruitteelt, 1951, **41**: 720-1, illus.

A serious disease of gooseberry bushes in North Holland is attributed to virus infection. The abnormal fruit and leaves on the variety Whinham's Industry are illustrated. The symptoms are as follows : (1) The fruits are irregular and roundish rather than elipsoid. (2) The leaves are smaller and relatively broader than long; mosaic markings are sometimes shown. (3) The foliage is more shiny than that of healthy bushes. (4) The plants are smaller and more bushy. (5) In winter the buds are smaller and rounder than normal. (6) In two years the yield of diseased bushes becomes uneconomically low. Until more is known about the disease growers are advised not to take cuttings from bushes showing symptoms.

2312. Gigante, R.
Il mosaico del pesco. (**Peach mosaic.**) [English summary ¼ p.]
Boll. Staz. Pat. veg. Roma, 1948 (issued 1950), **6**: 19-30, bibl. 20, illus.

The symptoms of a peach mosaic in Italy are yellowish areas on the young and old leaves, and sometimes longitudinal stripes and starlike spots. The chlorotic areas of the leaves are thinner than the rest and the branches of diseased plants have an abnormal number of nodes. The disease is transmissible only by grafting, not by seed. None of the Italian peach varieties observed appeared to contract the disease under natural conditions.

2313. Wolfe, H. R., and Anthon, E. W.
Western X-disease may be spread by more than one species of insect.
Proc. 47th annu. Mtg Wash. St. hort. Ass. 1951, pp. 61-2, bibl. 3.

Anthon, E. W., and Wolfe, H. R.
Additional insect vectors of western X-disease.
Plant Dis. Reptr, 1951, **35**: 345-6, bibl. 1.

Western X-disease of peaches has been transmitted from peach to peach by *Fieberiella florii*, *Keonolla confluens*, and *Scaphytopius acutus*. *E. florii* also transmitted western X-disease to peach from sweet cherry affected with western X-little cherry under both field and greenhouse conditions.—Tree Fruit Experiment Station, Wenatchee, Washington.

2314. Demaree, J. B., and Marcus, C. P.
Virus diseases of strawberries in the United States, with special reference to distribution, indexing, and insect vectors in the east.
Plant Dis. Reptr, 1951, **35**: 527-37, bibl. 16, illus.

Most plants of cultivated strawberries in the eastern United States are infected with one or more viruses. Definite identifying characters are not commonly seen. The chief symptoms of varieties most sensitive to virus infection are dwarfing and reduction in number of runner plants resulting in thin stands of plants and consequently lower berry yields. The presence of virus diseases in varieties which show no definite symptoms can be demonstrated by indexing to a more sensitive variety or species such as a European clone of *Fragaria vesca*. Two distinct types of associated symptoms were separated as type 1 and type 2. Type 1 plants show dwarfing, leaf distortion, crinkling and chlorotic spotting. Type 2 plants are dwarfed, the leaves are yellowish green, smooth and symmetrical and the petioles are short. It is believed that the vectors under field conditions are mostly *Capitophorus fragaefolii*, *C. minor* and an unnamed species resembling *C. fragaefolii*. Virus-free plants of four southern varieties—Klondike, Klonmore, Tennessee Beauty and Tennessee Shipper, under test since 1949—were the first to be furnished to co-operating nurseries for mass propagation. Ten other varieties considered virus-free are suitable for the northern strawberry sections. Fourteen other varieties are tentatively considered virus-free but are not yet fully tested.—U.S. Bureau of Plant Industry, Beltsville, Maryland.

2315. Schwartze, C. D., and Myhre, A. S.
Results of grafting Northwest and Marshall strawberry plants to a virus indicator.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 80-90, bibl. 30, illus., being *Sci. Pap. Wash. St. agric. Exp. Stats.* **1024**.

The grafting method of detecting the presence of viruses in strawberry plants developed by Harris and others [see *H.A.*, 12: 437 and earlier] was used to determine whether certain symptomless hybrids in Washington State were resistant or tolerant. Instead, however, of using the European *F. vesca* as the indicator a wild Californian strawberry, provisionally called *F. vesca* Calif., was used. Grafts with 2 symptomless hybrids, Northwest and Washington 203, previously exposed to infection, and with Marshall plants showing typical, severe symptoms of yellows, resulted in severe degeneration of the indicators, and it is concluded that these symptomless selections are tolerant rather than immune. When symptomless, "certified" Marshall plants from 3 sources were grafted, all the indicators for 2 lots developed symptoms, but of a milder nature than those produced by yellows. Two symptom-types, differing chiefly in severity, developed consistently in paired samples. A non-certified Marshall plant also developed symptoms similar to those reported for yellow-edge.

2316. Posnette, A. F., and Bovey, R.
Field studies on virus diseases of strawberries. I. The rate of virus spread in the variety Auchincruive Climax.
A.R. East Malling Res. Stat. for 1951, 1952, A35, pp. 136-8, bibl. 5.

When plots of the strawberry Auchincruive Climax were tested six months, one, two, and three years after planting with virus-free stock, samples were found to contain 0, 10, 50 and 100% infected plants respectively. The importance of this finding in relation to special stock propagation is emphasized. [Authors' summary.]

2317. Smith, H. E.
Aphid transmission of strawberry viruses from commercial plants to *Fragaria vesca* L. (East Malling clone).
From abstr. in *Phytopathology*, 1952, **42**: 20.

Virus-free wingless *Capitophorus fragaefolii* were allowed to feed on three selected commercial plants and then transferred for infection feedings for various periods to healthy plants of *Fragaria vesca*. Virus 2 (Demaree and Marcus) showed symptoms in 23 days, virus 1 in 10 days. The third virus caused dwarfing, extreme arching of midveins, and irregular chlorosis along veins.

2318. Smith, H. E., and Moore, J. D.
Dodder transmission of strawberry viruses.
From abstr. in *Phytopathology*, 1952, **42**: 20.

When stems of dodder (*Cuscuta sub-inclusa*) were trained from healthy to selected diseased strawberry plants and thence to healthy *Fragaria vesca* (East Malling clone) for 2 weeks, virus 1 was transmitted with 26% infection and symptoms in 11-17 days, virus 2 with 46% infection and symptoms in 25-40 days, and a third virus with 33% infection and symptoms in 28-38 days.

2319. Stoner, W. N., Stover, L. H., and Parris, G. K.
Field and laboratory investigations indicate grape degeneration in Florida is due to Pierce's disease virus infection.
Plant Dis. Reptr, 1951, **35**: 341-4, bibl. 9, illus.

The observations here recorded are generally consistent with what is known of Pierce's disease of grape in California.—Everglades Experiment Station, Belle Glade, Florida.

Bacteria.

(*See also* 2061.)

2320. Jenkins, P. T.
Crown gall on plants.
J. Dep. Agric. Vict., 1952, **50**: 87-8, illus.
The following advice is given: When plants are removed because of crown gall, replanting should not be carried out until the soil has been sterilized either by fallowing for at least 12 months or by applying commercial formalin 1 in 25 at the rate of 1 quart per sq. ft. or chloropicrin at the rate of 2 c.c. injected per 9 in. centre over the area previously occupied by the roots. On established trees, galls can be eradicated by painting the surface of the gall with a solution of metallic iodine 10 parts, glacial acetic acid 25 parts, glycerine 25 parts, methyl alcohol 50 parts, or metallic iodine 12 parts, glacial acetic acid 15 parts, methyl alcohol 100 parts. Better control is given if the gall is chipped off before treatment; in this case, the first solution should be diluted with methyl alcohol 5 times, and the second solution 6 times, care being taken that the application is made only on the gall tissue.

2321. Demaree, J. B., and Smith, N. R.
Blueberry galls caused by a strain of *Agrobacterium tumefaciens*.
Phytopathology, 1952, **42**: 88-90, bibl. 4, illus.
Culturally, the blueberry organism resembles rather closely apple and peach strains of *Agrobacterium tumefaciens*, and, as all three strains produced small galls on certain plants, it is concluded that they should be considered strains of the same species.—Plant Industry Station, Beltsville, Maryland.

2322. Murneek, A. E.
Thiolutin as a possible inhibitor of fire blight.
Phytopathology, 1952, **42**: 57.
Promising results in the control of fire blight in trials on Jonathan apple trees in Missouri were obtained with Thiolutin, an antibiotic substance isolated from certain strains of *Streptomyces albus*. The preparation was applied on 5 May, when about 90% of the flowers were open, at the rate of 19 g. per 100 gal.—University of Missouri.

2323. Sprague, R.
Blossom sprays and dusts to curb fire blight.
Proc. 47th annu. Mtg Wash. St. hort. Ass. 1951, pp. 142-3.
Parzate, bordeaux and copper-lime dust showed promise in fire blight control on pears in Washington.

2324. Starr, M. P., Cardona, C., and Folsom, D.
Bacterial fire blight of raspberry.
From abstr. in *Phytopathology*, 1952, **42**: 114.
Bacterial fire blight of Latham red raspberry has been observed in central Maine. In the field and under greenhouse conditions infection occurred on leaves, flower buds and stems, causing purple discoloration soon followed by exudation of bacterial drops and invasion of diseased tissues by *Fusarium*, *Botrytis*, *Alternaria*, and *Cladosporium*. The name *Erwinia amylovora* f.sp. *rubi* has been suggested for this form of the fire blight organism on raspberries.

2325. Mason, C. L.
Fall spraying in the control of bacterial spot of peaches.
From abstr. in *Phytopathology*, 1952, **42**: 14.
Preliminary tests in the autumn of 1949 indicated beneficial results in the control of bacterial spot of peaches (*Xanthomonas pruni*) by spraying with copper sulphate and water [concentration not given]. In the autumn of 1950 these results were confirmed. In all sprayed plots there was less disease on both foliage and fruit than on comparable unsprayed plots.

2326. Patel, M. K., and Kulkarni, Y. S.
A new bacterial leaf spot on *Vitis woodrowii* Stapf.
Curr. Sci., 1951, **20**: 132.
The symptoms on *Vitis woodrowii* and the causal organism *Pseudomonas vitis-woodrowii* sp. nov. are described. It is not pathogenic on *V. vinifera*.

Fungi.

(*See also* 2452f, g, w, 2889.)

2327. Vergara Castillo, C.
Nuevas determinaciones micológicas para Chile. **(Some fungi reported for the first time in Chile.)**
Agric. téc. Chile, 1951, **11**: 86-90, bibl. 3.
These include *Cercospora cladosporioides* on olive, *Cytospora microspora* on quince, *Fusarium* sp. on tobacco, *Monilia cinerea* on peach, and *Plectodiscella piri*, *Schizophyllum commune* and *Valsa leucostoma* on apple.

2328. Young, W. J., and Beneke, E. S.
Treatments to prevent fruit storage rots.
From abstr. in *Phytopathology*, 1952, **42**: 24.
Tests showed that the sodium salt of dehydroacetic acid (DHA-S) in 0·5% solution, used as a dip, gave excellent results in controlling the common storage moulds *Rhizopus*, *Botrytis and Alternaria*, and in preserving the appearance of raspberries, strawberries and cherries.

2329. Jenkins, P. T.
Armillaria on fruit trees.
J. Dep. Agric. Vict., 1952, **50**: 88-90, illus.
Armillaria root rot (*A. mellea*) is described with reference to its attack on fruit trees. Control measures recommended include the following: Sulphate of iron, broadcast over the potentially infected area at the rate of 1½ oz. per sq. yd., will retard spread of the disease. Where affected trees have been removed place 45 c.c. carbon bisulphide in holes 8 to 9 in. deep at 18 in. staggered intervals, and fill the holes with soil; after 60 days this will give complete kill to a depth of 60 in., or sterilization can also be obtained with chloropicrin at a rate of 2 c.c. injected per 9 in. centre over the area previously occupied by the roots of the tree. Spring and summer applications are the most certain to kill the fungus.

2330. Palmiter, D. H.
A blossom end rot of apples in New York caused by botrytis.
Plant Dis. Reptr, 1951, **35**: 435-6, illus., being *J. Pap. N.Y. St. agric. Exp. Stat.* **871**.
A blossom end rot of apples, caused by *Botrytis cinerea*, was observed on Rome Beauty and other varieties, including McIntosh and Cortland, in the Hudson Valley, especially in 1951. At present it is not serious, but, should there be any need to spray, the ferbam preparations show the most promise. [This disease appears to be the same as the dry eye rot of apples in England, see *H.A.*, 13: 1275.]

2331. Shay, J. R., and Hough, L. F.
Inheritance of cedar rust resistance in apple.
From abstr. in *Phytopathology*, 1952, **42**: 19.
Preliminary data indicate that resistance and susceptibility to cedar rust [*Gymnosporangium juniperi-virginianae*] are controlled by a single major factor pair with resistance dominant.

2332. Gaudineau, M.
L'oïdium du pommier: persistance et essais de lutte. **(Apple powdery mildew and its control.)**
Reprint from *C.R. Congr. Pomol. Metz*, 1951, pp. 69-73, bibl. 11.
An account is given of serious attacks of powdery mildew (*Podosphaera leucotricha*) on apple and pear trees, particularly on the apple varieties Jonathan and Morgendurf. Control trials were carried out for 3 years with (1) lime-sulphur 3% when the buds were swelling, (2) lime-sulphur 1·5% when the flower buds were showing, (3) lime-sulphur 1% after petal-fall. The results showed a marked reduction in attack from application 1; applications 2 or 3 helped to reduce secondary infections.

2333. Sprague, R.
Mildew spray trials at the Tree Fruit Station in 1951.
Proc. 47th annu. Mtg Wash. St. hort. Ass. 1951, pp. 144-9.
The incidence of apple, peach, cherry and pear mildews at the Tree Fruit Experiment Station, Wenatchee, Wash. is indicated, and the results obtained in 1951 from continued control trials are given. No material has yet been found to replace the sulphur compounds.

2334. Zacha, V., and Ševčík, Z.
Příspěvek k peniciliově hnilobě skladovaných jablek. **(Notes on the penicillium rot of stored apples.)** [English and Russian summaries 9 and 11 lines respectively.]
Sborn. čsl. Akad. Zeměd., 1951, **24**: 276-81, bibl. 6, illus.
Relative humidity was found to have no effect on the spread of necrosis in apples artificially infected with *Penicillium crustaceum* at 10° C. Even at the low humidity of about 5·5% the fungus grew and fructified. Of the 12 varieties tested all were susceptible to penicillium rot, although Ontario and Gold Pearmain showed slight resistance.

2335. McCrory, S. A., and Shay, J. R.
Apple scab resistance survey of South Dakota apple varieties and breeding stocks.
Plant Dis. Reptr, 1951, **35**: 433-4, bibl. 3.
Three highly resistant seedling varieties, Alexis, Dolgo, and Jonsib Crab have been derived from *Malus baccata*. This suggested that other *M. baccata* seedlings might be resistant, and some 1,300 seedlings were examined in the nursery. All but six of them became infected. Scions for propagating and further tests were collected from 5 of the scab-free trees. The susceptibility of Dolgo and Alexis in this field test is of interest since these varieties have shown only necrosis without sporulation in greenhouse infection tests and have remained scab-free in Indiana in the field since 1948.—S. Dakota agric. Exp. Stat.

2336. Ross, R. G.
Experiments with Crag fungicides for the control of apple scab.
88th A.R. N.Scotia Fruit Grs' Ass. 1951, pp. 143-6, being *Contr. Div. Bot. Plant Path., Sci. Serv., Dep. Agric. Ottawa*, **1132.**
On a commercial basis Crag Fruit Fungicide 341 and 341C were equally effective in controlling apple scab. The degree of control obtained depended upon the individual grower and the time of application. On an experimental basis, Crag Fruit Fungicide 341C gave better control than 341. Increasing the concentration of 341C did not increase its efficiency. No injury, except a slight bronzing to the undersides of the leaves, was observed from the use of these Crag fungicides. [Author's summary.]

2337. Harris, M. R., and Sprague, R.
Apple scab control.
Proc. 47th annu. Mtg Wash. St. hort. Ass. 1951, pp. 83-5.
In the southern half of the Washington apple growing area, where Delicious apples are injured by sulphur the use of Ferbam at the rate of 1½ lb. per 100 gal. is recommended. The newer scab control materials are briefly discussed.

2338. Kienholz, J. R., and Childs, L.
Pear scab in Oregon.
Stat. Tech. Bull. Ore. agric. Exp. Stat. **21**, 1951, pp. 31, bibl. 17, illus.
Scab (*Venturia pyrina*) consistently reduces the income from Oregon's pear crop more than any other disease. Symptoms on fruit, leaves, and twigs are described, and the life history of the fungus is discussed. All pear varieties grown in Oregon are susceptible, but some appear to offer resistance in certain districts or in particular orchards of the same district. There are strains of the fungus which attack only one pear variety or only a few varieties. Russet caused by fungicides under different environmental conditions is discussed. A minimum of 6 gal. of lime-sulphur to 100 gal. of water is necessary in the delayed dormant spray to inactivate twig scab pustules. Cover applications at pre-pink, pink, and calyx stages are generally necessary for successful scab control. Later applications may be needed during excessively rainy seasons. Ferbam or ziram at 1½ lb. to 100 gal. of water is recommended for sulphur-sensitive varieties, and copper sprays may be substituted on the Comice variety. Lime-sulphur at 2½ lb. to 100 gal of water is suggested on varieties not susceptible to spray injury. Pear scab in storage is shown to originate as field infections, and visible scab spots enlarge only

slightly on stored fruit. Scabby pears transpire and lose weight more rapidly than sound pears in storage, but generally less than 1 lb. per box difference can be measured after 5 months in cold storage.

2339. SMEDING, P.
Vlekken op bladeren en vruchten bij de Zwijndrechtse Wijnpeer. **(Spotting of leaves and fruit on the pear variety Zwijndrechtse Wijnpeer.)**
Fruitteelt, 1952, **42**: 109, 117, illus.

In certain areas of Friesland the pear variety Zwijndrechtse Wijnpeer has been subject to severe infection by *Mycosphaerella sentina* in recent years. In spraying trials good control was obtained with applications after flowering of zinc carbamate, TMTD, wettable sulphur, and copper oxychloride. Copper oxychloride is, however, not recommended as it causes rough skinned fruit. A mercury preparation was ineffective.

2340. MCCLURE, T. T.
Experiences with cherry sprays in 1951.
From abstr. in *Phytopathology*, 1952, **42**: 14.

Seven synthetic organic materials were tested against leaf spot (*Higginsia hiemalis*) on acid cherries at two localities in Michigan. At one of them three preharvest sprays applied thoroughly and on time gave excellent control until 1 October, regardless of materials. At the other, in a similar programme, Orthocide 406 and actidione 2 p.p.m. gave the best control, with Glyoxalidine next best.

2341. MCCLURE, T. T., AND CATION, D.
Comparison of actidione with some other spray chemicals for control of cherry leaf spot in Michigan.
Plant Dis. Reptr, 1951, **35**: 393-5, bibl. 1, illus.

The experiments recorded confirm previous observations (*H.A.*, 20: 2613) that actidione has exceptional qualities as a foliage spray for sour cherries and give further indications that it has similar qualities for sweet cherry foliage. Observations indicated that the control of leaf spot [*Coccomyces hiemalis*] results from the eradicative properties of actidione. Its value as a lasting protectant was not determined. The minimal effective concentration for control of cherry leaf spot appears to be 1 p.p.m.

2342. HÅRDH, H. J. E.
Keltamuumiotaudin tarttuvaisuudesta sekä sen ehkäisemisestä paration-valmisteilla. **(The pathogenicity of *Monilinia fructigena* and the use of parathion in brown rot control.)** [English summary ¾ p.]
Maataloust. Aikakausk., 1951, **23**: 79-87, bibl. 15.

The significance of fruit lesions of different kinds in brown-rot infection has been investigated. *Monilinia fructigena* conidia were rubbed with a paint brush on the surface of apples uninjured and injured in different ways. All the uninjured fruits remained healthy. Patches where slight injury had been caused by copper lime 0·5% (Cuprosan 3) and smallish spots due to apple scab were also unfavourable to the penetration of the brown-rot fungus. Infection in the former case was nil, in the latter 7·1% of the apples inoculated. The inoculation of apples with severe corking and cracking resulted in 20·0% infection and the inoculation of fruits injured by the codling moth in 75·0% infection. All the fruits were infected when conidia were placed in a wound made with a knife-blade. It is thought that the susceptibility of lesions of different kinds to the brown-rot fungus is chiefly due to the moisture of the substrate and the air in the immediate proximity of the growing hypha. Spraying with the usual fungicides appears to be successful in controlling the brown-rot disease only if every fresh wound is covered. The control of apple scab and codling moth is also of importance, to avoid lesions made by these. [From author's summary.]—Preliminary laboratory and field trials indicate that parathion has a fungistatic action on *M. fructigena* and that the insecticide may come to play a part in brown-rot control. [The tabulated data are presented in Finnish and English.]—Agricultural Research Centre, Finland.

2343. PREW, H. A.
Brown rot of stone fruit.
N.Z. J. Agric., 1952, **84**: 28, bibl. 1.

The cause (*Sclerotinia fructicola*) and symptoms of this disease in New Zealand are mentioned, and the usual hygienic measures outlined. The spray programme includes, for peaches, applications of bordeaux mixture 5 : 4 : 50 at bud movement, lime sulphur 1 : 100 at late pink, lime sulphur 1 : 150 plus colloidal sulphur (40%) 2 lb. to 100 gal. at petal fall and on 4 further dates during fruit development, and bordeaux mixture at leaf fall. On apricots, which are susceptible to sulphur damage, bordeaux mixture should be used throughout.

2344. MOORE, M. H.
Note on infection of young peach shoots and of leaves by the brown rot fungus, *Monilia fructigena*.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, p. 148, bibl. 2, illus.

Brown rot infection (*Monilia fructigena*) was noted in vigorous peach shoots of the current year. Infection may occur through wounds or, apparently, through lenticels. Spore-inoculated, unwounded leaves also became infected. [Author's summary.]

2345. FOSTER, H. H.
Organic vs. inorganic fungicides for the control of the brown-rot fungus on peaches.
From abstr. in *Phytopathology*, 1952, **42**: 7.

In field and storage trials against peach brown rot wettable sulphur was compared with several organic preparations. At 6 lb./100 gal. it proved the most satisfactory of the substances tried, but Orthocide 406, second in order of control, usually gave fruit of a better colour.

2346. SHURTLEFF, M. C., AND SHUTAK, V. G.
Control of peach brown rot with the sodium salt of dehydroacetic acid.
From abstr. in *Phytopathology*, 1952, **42**: 19.

Ripe peaches were inoculated in different ways with the brown rot fungus and then dipped for 10 sec. in water, a wettable sulphur suspension (8-100) or the sodium salt of dehydroacetic acid (0·5, 1·0 and 1·5%). The dehydroacetic acid preparation (DHA-S) at 1·0 and

1·5% proved to be far superior to wettable sulphur in preventing storage rot.

2347. Sharvelle, E. G., and Vandemark, J. S.
Volatile chemicals for the inhibition of fruit losses in storage and transit.
From abstr. in *Phytopathology*, 1952, **42**: 19.
Brown rot in inoculated peaches was completely inhibited at room temperatures over a 4-day period by exposing the fruit for 19 hours to volatile hydrocarbons. The chemicals at concentrations from 1 : 40,000 were lethal to pure cultures of *Monilinia fructicola*.

2348. Vandemark, J. S., and Sharvelle, E. G.
Prevention of postharvest decay of stone fruits by volatile chemicals.
Science, 1952, **115**: 149-50.
Peaches and plums were inoculated with a mixed spore suspension of *Monilinia fructicola* and *Rhizopus* spp., incubated for 24 hr. at 80° F., and then subjected to treatment with several volatile chemicals for 24 hr. before being stored for 72 hr. at laboratory temperatures. Trichloroethylene at 1 : 10,000 and 1 : 4,000 prevented all breakdown without injury to the fruits, whereas untreated controls showed complete breakdown within the 5-day period. Several other volatile compounds also inhibited rot, but at the concentrations used caused some browning of the fruit.—Purdue Univ.

2349. Diehl, W. W.
A microstroma on peach.
Plant Dis. Reptr, 1951, **35**: 497, bibl. 5, illus.
A disease of peach foliage in South Carolina shows conspicuous necrotic lesions bearing a fungus with features suggesting relationship, if not identity, with *Microstroma tonellianum* Ferraris reported on plum in northern Italy by various observers.

2350. Zobrist, L., and Hoffmann, E.
Der Zwetschgenrost und seine Bekämpfung. (*Tranzschelia pruni spinosae* **rust and its control.**)
Schweiz. Z. Obst- u. Weinb., 1952, **61**: 169-73, illus.
Rust on plums was successfully controlled in Switzerland by 2-3 applications of 0·2% thiocarbamate (M555). Wettable sulphur and lime sulphur were ineffective and copper sprays caused leaf injury.

2351. Geelen, T. E. J. M.
De roestziekte van de zwarte bes. (**Black currant rust.**)
Fruitteelt, 1952, **42**: 143.
From results of spraying trials on black currant it was concluded that 0·4% copper oxychloride gave good control of rust, *Cronartium ribicola*, when applied twice, the first application about the middle of June as the berries began to colour, the second immediately after picking.

2352. Grente, J., and Solignat, G.
La maladie de l'encre du châtaignier et son évolution. (**The ink disease of chestnut and its evolution.**)
C.R. Acad. Agric. Fr., 1952, **38**: 126-9, bibl. 1.
The ink disease of chestnuts (*Phytophthora cambivora* and *P. cinnamomi*) in relation to chestnut production in France is reviewed, and the conclusion is drawn that this disease is the chief cause of the deterioration of chestnut growing in France. Attention should be given to the use of resistant varieties, of which there are already a number of types known.

2353. Camici, L.
La "mummificazione delle castagne" da *Phomopsis viterbensis* sp. n. (**Mummification of chestnuts caused by *Phomopsis viterbensis*** n. sp. [English summary ½ p.]
Boll. Staz. Pat. veg. Roma, 1948 (issued 1950), **6**: 79-88, bibl. 5, illus.
During the winter of 1947 a new disease was observed in chestnuts grown in the province of Viterbo, Italy. It is named "mummification" on account of the changes the fruit undergoes. The chestnuts appear quite sound externally, but the cotyledons are covered with a thin white pellicle of mycelium; the pulp becomes hard and contracted and has a slight yeast-like smell. The fungus probably reaches the chestnuts through their apices and attacks the fruit during storage. Care and cleanliness should be observed during the interval between picking and storing.

2354. Young, W. J., and Fulton, R. H.
A field test of several fungicides for the control of powdery mildew on Lucretia dewberry in 1951.
Plant Dis. Reptr, 1951, **35**: 540-1, bibl. 5.
Six organic fungicides were compared as pre-harvest sprays in one and two applications both with and without a spreader, Triton B 1956, for the control of powdery mildew, *Sphaerotheca humuli*. Actidione gave the best control but the mildew reappeared when treatments were discontinued.—Michigan State College, East Lansing.

2355. Lentz, P. L.
Labrella coryli **(Desm. & Rab.) Sacc. on filberts in North America.**
Plant Dis. Reptr, 1951, **35**: 437-8, illus.
A leaf disease of filbert hybrids (*Corylus americana* × *C. avellana*), causing severe defoliation about the time the nuts were filling, is described. Of the two varieties concerned, Reed and Potomac, the former was about 4 times more severely affected than the latter. Affected leaves show a marginal browning, particularly near the tip but gradually involving more and more of the margin and usually spreading inwards towards the midrib. A fungus found on the leaves and apparently causing the trouble was *Labrella coryli*.—U.S. Division of Mycology and Disease Survey.

2356. Flipse, L. P., and van Katwijk, W.
Stengelziekten bij frambozen en bramen. (**Cane diseases of raspberries and blackberries.**)
Fruitteelt, 1952, **42**: 128-30, illus.
Reference is made to spur blight (*Didymella applanata*), cane blight (*Leptosphaeria coniothyrium*), verticillium wilt, and anthracnose (*Elsinoe veneta*) of raspberries, and purple blotch (*Rhabdospora ramealis*) of blackberries. Notes are given on spraying with copper oxychloride, bordeaux mixture and carbamates.

2357. Fulton, R. H., and Tompkins, J. P.
Comparison of fungicides for the control of spur blight and anthracnose of raspberry.
From abstr. in *Phytopathology*, 1952, **42**: 8.
Various sprays for spur blight (*Didymella applanata*) control were applied to heavily infected Latham raspberries when the suckers were 7-10 in. high, and again 12 days later. On unsprayed plants 60% of the buds were infected. Ferbam resulted in 10·4%, ziram 25·6% and tribasic copper 32·5% infection. Other materials tried were less effective. Bordeaux mixture 6-12-100 plus 2 qt. Dendrol as a delayed dormant spray reduced infection 32%. For summer applications following either Krenite or lime sulphur dormant sprays, both ferbam and Ortho 406 gave comparative control, reducing infection approximately 80% with one application and 93% with two.

2358. Winter, H. F.
Fungicides, timing of sprays, and methods of application for raspberry anthracnose control.
From abstr. in *Phytopathology*, 1952, **42**: 23.
Trials were carried out with organic fungicides applied prebloom and postbloom to New Logan plants which had received the standard delayed dormant spray of 8 gal. of liquid lime-sulphur per 100 gal. of spray. The results, given as average number of lesions per cane on 20 July, were as follows: ferbam, 1·6; manganese ethylene bis dithiocarbamate, 2·9; Orthocide 406, 2·1; Crag 341, 11·5; ferbam plus Phygon, 2·5; control, reducing infection approximately 80% with one application and 93% with two.

2359. Chamberlain, G. C.
Control of anthracnose of red raspberries and downy mildew of grapes in Ontario.
Abstr. in *Proc. Canad. phytopath. Soc.* 1951, **18**: 10, from abstr. in *Rev. appl. Mycol.*, 1952, **31**: 69.
When Taylor red raspberries in Ontario were sprayed against anthracnose (*Elsinoe veneta*) with a delayed dormant application of 1 in 10 lime-sulphur or 1% dinitro-*o*-cresylate alone or in combination with a summer application of fermate, bordeaux mixture, or phygon, the delayed dormant spray alone gave good commercial control, and when followed by the summer spray gave excellent results. Bordeaux plus orthex spreader-adhesive was the most effective treatment against vine downy mildew (*Peronospora viticola*) on the highly susceptible Fredonia, Agawan, and Delaware varieties in the Niagara Peninsula, the 5-5-100 formula comparing favourably with the Standard 7½-10-100 concentration.

2360. Fulton, R. H.
Comparison of fungicides for control of powdery mildew on the Latham red raspberry in 1950.
Plant Dis. Reptr, 1951, **35**: 538-9, bibl. 3.
From the results of the trials described for the control of *Sphaerotheca humuli*, it may be concluded that sulphur applications, although showing control, are too dangerous. Ferbam and Arathane thoroughly applied as post-harvest sprays gave decided reduction in powdery mildew infection.—Michigan State College, East Lansing.

2361. Wade, G. C.
White root rot of raspberries.
Aust. J. sci. Res., Ser. B, biol. Sci., 1951, **4**: 211-22, bibl. 11, illus.
Investigations on this disease, first described in 1897, over the period 1941-47 are reviewed. Apart from a recent isolated case in Tasmania, it has not been reported outside Victoria, probably largely because low soil moisture content and high soil temperature are necessary factors for its development. The disease spreads by means of undifferentiated rhizomorphs and requires a food base; movement of soil that contains the fungus not attached to root or cane material will not spread the disease. As yet it remains unidentified.
A.C.S.

2362. Fulton, J. P.
Rhizoctonia leaf blight of strawberries.
From abstr. in *Phytopathology*, 1952, **42**: 8.
In late summer of 1950 a severe leaf blight of strawberries was widespread in several areas in Arkansas. Black or dark brown lesions, often angular and irregular in outline, appeared on the leaves, which were rapidly killed. Affected areas in the field were circular, 1-4 ft. in diameter. In these affected spots all the leaves were killed but the crowns were not injured. The fungus *Rhizoctonia solani* was consistently isolated from diseased material and is assumed to be the cause.

2363. Wilhelm, S.
Verticillium wilt and black root rot of strawberry.
Calif. Agric., 1952, **6**: 1: 8-9, 14, illus.
Trials suggest that fumigation with technical chlorobromopropene (CBP-55) in split treatments totalling 30 gal. per acre may provide a means of controlling wilt caused by *Verticillium albo-atrum* and black root rot, with which several fungi seem to be associated. Some measure of control was also obtained with DD at 40 and 80 gal. per acre. As regards verticillium wilt the varieties Lassen, Donner and Cupertino are very susceptible, Shasta and Campbell less so, while Sierra is highly resistant.

2364. Capetta, G. B.
Ricerche sulle condizioni ecologiche per l'insorgere dell' epidemia da oidio nella vite dell' Oltrepò pavese. (**Epidemic outbreaks of oidium on vine in the upper regions of the Po valley.**)
Atti Ist. bot. Univ. Pavia, 1951, **8**: 231-42, bibl. 5.
This is an account of observations on the incidence of vine powdery mildew [*Uncinula necator*] in vineyards of the Po valley. It was found that the mildew began to develop at about 6° C. which is that at which the vines resume growth. This confirms the necessity for early applications of sulphur, especially in those vineyards where the disease had been severe during the previous year, for the fungus hibernates on the buds. The conditions which favour outbreaks are low air humidities alternating with slight showers. The incubation period of the fungus is about 6 days, so that treatments should be applied every six days. The optimum temperature for the disease is 20-25° C.

2365. Fainštein, R. M.
A bacterial method of oidium control. [Russian.]
Vinodelie i Vinogradarstvo, 1952, No. 2, pp. 44-5.

Manure solution sprayed on vines is claimed to give very good control of oidium disease. One part of well rotted stable manure is soaked in 3 parts of water for 3 days, after which the solution is drained off and diluted by a further 3 parts of water. The spray equipment must be clean and not contain even traces of toxic chemicals, and the treatment should be applied very early in the morning, in the evening or on dull days so as not to expose the bacteria to direct sun light during the operation.

2366. Gallay, R., Terrier, C., and Trivelli, G.
Le mildiou de la vigne. Les expériences de 1951. **(Downy mildew of vine. The 1951 experiments.)**
Rev. romande Agric. Vitic., 1951, **7**: 81-90, illus.

The 1951-experiments of the Lausanne Research Station and enquiries made among viticulturists in the Lausanne area confirm again [see *H.A.*, 19: 1021] the superiority of bordeaux mixture for downy mildew control to other copper fungicides, thanks to its persistence on foliage and grapes. For pre-blossom applications, however, cuprous oxide, copper oxychloride and other sprays were found to be preferable, as they cause less damage to the tender leaves. Copper carbonate may be used for post-blossom applications as an alternative to 2% bordeaux mixture in the case of table grapes where the residue would be a disadvantage. Under normal conditions the treatments should be applied at 10-day intervals.

2367. Braun, A. J.
Control of black rot and downy mildew of grapes with concentrated sprays, dry dusts, and wet dusts.
From abstr. in *Phytopathology*, 1952, **42**: 3.

Using a machine considered to be adequately adapted for vineyard use, data obtained indicate that the control obtained with concentrated sprays (25 gal. per acre) is comparable with that obtained by an equal number of regular spray applications (100 gal. per acre). Dry and wet dust applications were equally effective in tests where disease development in control plots was moderate.

2368. Blumer, S., and Kundert, J.
Die Peronospora der Rebe und ihre Bekämpfung im Jahre 1951. **(Downy mildew of vine and its control in 1951.)**
Schweiz. Z. Obst- u. Weinb., 1952, **61**: 57-63, illus.

Owing to unfavourable weather conditions downy mildew was widespread in Switzerland in 1951. In trials at Wädenswil an organic fungicide not yet on the market gave the most satisfactory control of the disease. Second in effectiveness was a pre-blossom application of 0·3% thiocarbamate followed by a post blossom bordeaux mixture spray. Results from bordeaux treatments alone were disappointing during these tests.

2369. Magnani, G., Ciccarone, A., and Sibilia, C.
Prove preliminari di lotta antiperonosporica con preparati organici. **(Preliminary trials with organic fungicides against vine downy mildew.)** [English summary ½ p.]
Boll. Staz. Pat. veg. Roma, 1949 (issued 1951), **7**: 159-66, bibl. 19.

Tests have been carried out near Rome for the control of vine downy mildew (*Plasmopara viticola*) with certain organic compounds in comparison with 1% bordeaux mixture. The mildew was especially noticeable in June and in September; it was checked by the hot, dry weather of July and August. The infections were sufficient to show differences in the effect of the organic compounds on the sugar content of the fruit, the weight of the crop, and the earliness of defoliation. Among the new compounds, only Parzate seemed of any promise, and it is considered that even Parzate might be usefully replaced by bordeaux mixture in the last summer spray. The ordinary sulphur dustings were made to control powdery mildew (*Uncinula necator*).

2370. Sarasola, A. A.
Alternaria tenuis como agente etiológico de una nueva enfermedad del olivo. **(*Alternaria tenuis* as the causal agent of a new disease of olives.)** [English abstract ¾ p.]
Lilloa, 1949, **21**: 7-24, bibl. 14, illus. [received 1952].

A disease of olives causing death of the twigs is widespread throughout Argentina. In the province of Buenos Aires the disease also attacks leaves and fruits, the leaves dying from the tips backwards and developing ashen spots and the fruits splitting and showing pit marks. Large fruited varieties suffer most from fruit infection and the varieties Ascolano, Frantoio and Leccino are most susceptible to twig infection. It was shown by isolations and artificial infection that the disease is caused by *Alternaria tenuis*, a fungus often present in sooty mould. The morphology of the fungus is described. Soil treatments and limb injections of boron and copper compounds did not control the disease

2371. Ruggieri, G.
Richerche ed esperienze su una tracheoverticilliosi dell'olivo. **(A verticillium dieback of olive trees.)** [English summary ½ p.]
Boll. Staz. Pat. veg. Roma, 1948 (issued 1950), **6**: 71-8.

The olive tree has been found as a new host of *Verticillium albo-atrum* in Sicily. The disease is limited to irrigated areas where the olive tree is grown together with tomatoes, eggplants, peppers and potatoes. The external symptoms are a yellowing, wilting, and withering of the apical leaves of the branches, and there is a gradual dying back. Sections of the stem show a discoloured vascular system as is usual in tracheomycosis caused by *Verticillium* species. The fungus develops very slowly within the olive tree. In this evergreen plant, in contradistinction to what occurs in deciduous trees such as plum and cherry, the mycelium passes from the old to the new annual ring of xylem and so the host has not the ability to recover shown by drupaceous trees. It is advised that

the vegetables mentioned above, which are very susceptible to verticillium infection, should not be grown near olive plantations.

Mites.

(*See also* 2452s.)

2372. Gerritsen, J. D.
De natuurlijke vijanden van de vruchtboomspintmijt. **(The natural enemies of the fruit tree red spider mite.)**
Fruitteelt, 1952, **42**: 27, illus.

Brief descriptions are given of four natural enemies of the fruit tree red spider mite, viz. *Scymnus punctillum*, *Oligota pusillima*, *Anthocoris nemorum*, and *Orius minutus*. They are all very sensitive to DDT, and winter spraying with DDT preparations will tend to reduce their numbers.

2373. Ahlberg, O.
Vinbärsgallkvalstret. **(The black currant gall mite.)**
Växtskyddsnotiser, 1951, No. 2-3, pp. 26-9, illus.

Ten applications of 2% lime-sulphur reduced big bud in black currants from 23% in the controls to 7%, and bushes treated with E605 had an *Eriophyes ribis* infestation of 11-12%. Picking out buds that showed the symptom was unsatisfactory as the presence of the gall mite was not always recognizable, and even cutting down the bushes to the ground did not give complete control, since the mite survived in underground parts of the plant. It is suggested that the pest can be kept in check by spraying, except in cases of severe infestation where burning of the whole plant is advisable.

2374. Leib, E.
Erster Erdbeermilbenbefall im Saarland. **(The first infestation by the strawberry mite in the Saar.)**
Z. PflKrankh., 1951, **58**: 433-5, illus.

The first occurrence of the strawberry mite, *Tarsonemus pallidus*, in the Saar was recorded in May 1951. It was found to be severely attacking a variety considered to be Ananas.

Insect pests.

(*See also* 2452b, d, i, y, 2984, 3172, 3232, 3252b.)

2375. Massee, A. M.
Notes on some interesting insects observed in 1951.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 155-61.

Short notes are given of some 18 interesting insects and mites found on fruit during 1951. Among those mentioned are the apple and currant clearwing moths, the apple fruit miner, the pear sawfly, the dock sawfly and the pear sucker. The mullein leaf bug which occurs on apple and other hosts is also referred to briefly. [Author's summary.]

2376. Rebour, H.
L'ensachage des fruits. **(Bagging fruits.)**
Rev. hort. Algér., 1951, **55**: 114-16, illus.

An account is given of the method and costs of bagging to obtain fruits of high quality and to protect them from certain pests in North Africa, with particular reference to the peach variety J. H. Hale.

2377. Sokolov, A. M., and Sokolova, R. A.
The role of the osmotic pressure of the cell sap in the resistance of the apple to the green apple aphid—*Aphis pomi* Deg. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1952, **17**: 2: 12-18, illus.

The feeding, development, and reproduction of the green apple aphid, *Aphis pomi*, are regulated by the magnitude of the osmotic pressure of the cell sap of the plant. The number of aphids infesting the leaves of various parts of the plant decreases as the osmotic pressure of the cell sap increases. The magnitude of the osmotic pressure of sap in the apple tree depends on the age and vigour of the plant and the organ, the variety of apple, the conditions during growth, and on the concentration of the soil solution; these factors affect the resistance of the plant to the aphid. The osmotic pressure is a result of the biochemical processes in the plant, and it changes according to the morpho-anatomical structure of the plant.

2378. Anthon, E. W.
New insecticides, including systemic insecticides, for control of black cherry aphids.
J. econ. Ent., 1951, **44**: 1012, being *Sci. Pap. Wash. St. agric. Exp. Stats.* **989**.

Trials in Washington have shown the systemic insecticides octamethylpyrophosphoramide at 0·8 pt., trialkyl thiophosphate at 0·25 pt. and a selenium compound at 0·25 pt. per 100 gal. to give 100% control of black cherry aphid, *Myzus cerasi*. Other compounds which gave good commercial control are listed.

2379. Dicker, G. H. L.
Studies in population fluctuations of the strawberry aphid, *Pentatrichopus fragaefolii* (Cock.). I. Enemies of the strawberry aphid.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 166-8, bibl. 5.

The strawberry aphid, *Pentatrichopus fragaefolii* (Cock.), is on rare occasions parasitized by *Aphidius* sp. and *Aphelinus asychis* Walk., more frequently by the fungus *Empusa planchoniana* (Cornu) Petch. Among 16 insects and mites listed as predators only *Anthocoris nemorum* (L.), *Tachyporus hypnorum* (F.) and *T. obtusus* (L.) occur regularly on strawberry. [Author's summary.]

2380. Stanley, W. W.
Experiments to control the woolly apple aphis on nursery stock.
J. econ. Ent., 1951, **44**: 1006-7, bibl. 1.

The investigation carried out over 2 seasons at 2 centres in Tennessee showed good control of woolly apple aphis [*Eriosoma lanigerum*] by BHC and chlordane, fair by aldrin, and only slight control by parathion.

2381. Sylvén, E.
Blodlusarbetet i spärrzonen. **(Woolly aphid inventory in the so-called buffer zone [Sweden].)**
Växtskyddsnotiser, 1951, No. 1, pp. 7-12, 1 map.

For the records of woolly aphid-infested trees in the so-called buffer zone in Skåne, which was established

in 1945 [see *H.A.*, 20: 723]. The work was continued in 1949 and 1950 and further developments are illustrated diagrammatically and graphically. With the exception of one particular locality, the prospects of eradicating the pest in this area by the vigorous control measures adopted appear very promising.

2382. WALTON, R. R.
Control of the red-necked cane borer on prostrate brambles by summer pruning.
J. econ. Ent., 1951, **44**: 950-4, bibl. 2.
In Oklahoma red-necked cane borer, *Agrilus ruficollis*, infestation of boysenberries and youngberries was satisfactorily controlled by pruning off the spring canes, thereby causing the development of a second set of canes after most eggs had been laid. Post-harvest pruning proved to be more effective than pre-harvest pruning, but is recommended only for irrigated plantings, as under dry conditions it reduces yields.

2383. HOUGH, W. S.
Control of plum curculio on plums.
J. econ. Ent., 1951, **44**: 992-3, bibl. 4.
In Virginia parathion applied at the rate of 2 lb. of 25% wettable powder in 100 gal. gave very good control of plum curculio [*Conotrachelus nenuphar*], without causing any noticeable injury.

2384. COCHRAN, J. H.
Tests with dusts against plum curculio.
J. econ. Ent., 1951, **44**: 940-2, bibl. 1, being *Tech. Contr. S.C. Exp. Stat.* **182**.
Of a number of dust preparations examined by the South Carolina Experiment Station for their effectiveness against plum curculio, parathion and ethyl p-nitro-phenyl thionobenzenephosphonate were outstanding. Parathion-sulphur dust compositions lost very little of their effectiveness during storage for 1 year in kraft paper bags. Parathion dusts were as effective as parathion sprays in field tests.

2385. LLOYD, N. C.
The fruit tree bud weevil—a pest of young fruit trees in the Orange District.
Agric. Gaz., N.S.W., 1952, **63**: 90-2, 99, illus.
The fruit tree bud weevil (*Perpurus vermiculatus* Lea) is a serious pest of young fruit trees in certain parts of the Orange district of N.S.W. where it feeds on the swelling buds in spring. It has been recorded as attacking young apple trees and feeding on peach foliage. The weevil and its habits are described. A 1% DDT spray and a banding material impregnated with DDT were both very effective in keeping weevils off the trees. The spray should be applied at the first sign of the appearance of the pests or of damage by them, from early September on, with a second application 7 days later, and a third 16 days after the second.

2386. LEIB, E.
Selten starkes Auftreten des grauen Rüsselkäfers (*Peritelus griseus* Ol.) an Johannisbeeren. **(An exceptionally severe infestation by the grey weevil (*Peritelus griseus* Ol.) on currants.**
Z. PflKrankh., 1951, **58**: 430-2,bibl. 2, illus.
Previous reports of the grey weevil infesting hops and fruit trees and bushes are mentioned. A severe attack on a plot of 100 [red ?] currant bushes in the Merzig-Wadern/Saar district in May 1950, is described. Its severity is indicated by the fact that at a first determination about 8 litres of weevils were collected from the bushes (by shaking) and that 60% of the bushes were so defoliated and stripped of bark that they had to be destroyed. In laboratory experiments the weevil was found to be very resistant to synthetic insecticides. While a quick-acting Hexa-preparation and one phosphorester resulted in killing 100% in 3 days, another phosphorester and a DDT preparation required about 7 days to give the same result.

2387. FJELDDALEN, J.
Nytt skadedyr på jordbaer. **(A new strawberry pest.)**
Norsk. Hagetid., 1950, **66**: 168-70, illus.
While strawberry root weevil (*Otiorrhynchus ovatus*) infestation in Norway was sporadic in the years 1947-1949, the pest caused widespread damage in 1950. Losses from the clay-coloured weevil (*O. singularis*) and from the vine weevil (*O. sulcatus*) are also reported. Trials with soil insecticides are in progress at the Zoological Department of the Norwegian Plant Protection Service.

2388. ENTOMOLOGICAL BRANCH, DEPARTMENT OF AGRICULTURE, N.S.W.
Plant bugs (*Hemiptera*).
Agric. Gaz. N.S.W., 1952, **63**: 93-5, illus.
Short descriptions are given of the following fruit tree bugs: the metallic shield bug (*Scutiphora rubromaculata*), the cotton plant bug (*Dysdercus sidae*, which may attack fruit trees and garden plants as well as cotton), the harlequin bug (*Dindymus versicolor*), the crusader bug (*Mictis profana*), the leptocoris bug (*Leptocoris lurida*), and the horehound bug (*Agonoscelis rutila*). Where the bugs are found in numbers in sheds or on fences from which they may migrate to cultivated plants, one of the concentrated kerosene-DDT fly sprays may be used to control them. A 1% DDT emulsion may be used to control them on most garden plants, but pumpkins, melons, squashes and related crops should not be treated with DDT as they are very susceptible to DDT injury.

2389. KNOWLTON, G. F.
Boxelder bug damage to crops.
J. econ. Ent., 1951, **44**: 994.
A note on the incidence of boxelder bug, *Leptocoris trivittatus*, infestation in Utah on pears, peaches, apricots, raspberries, loganberries and potatoes.

2390. HILL, A. R.
Observations on *Lygus pabulinus* (L.), a pest of raspberries in Scotland.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 181-2, bibl. 2.
As well as perforating the leaves, the green capsid bug, *Lygus pabulinus* (L.), has been shown to cause branching of raspberry canes by damaging the growing points. Observations over a period of three years have shown that in Scotland two generations occurred each year on raspberry. This would seem to indicate a different behaviour from that described by some earlier writers who considered that this species migrated to herbaceous plants in early summer. [Author's summary.]

2391. Vasseur, R.
La mouche méditerranéenne des fruits dans la region lyonnaise. **(The Mediterranean fruit fly in the Lyons region.)**
Pomol. franç, 1952, **79**: 47-52.
Severe infestations of the Mediterranean fruit fly (*Ceratitis capitata*) around Lyons are mentioned; in several cases they have caused almost total loss of crop in the pear varieties Passe Crassane, Louise Bonne and Curé. Data tabulated show that the infestations have been most severe in years when the temperature sums during the growing period have been above normal.

2392. Vogel, W.
Witterung und Kirschenfliegenbekämpfung im Jahre 1951. **(The weather and cherry fruit fly control in 1951.)**
Schweiz. Z. Obst- u. Weinb., 1952, **61**: 67-71.
The optimum soil temperature for cherry fruit fly emergence lies between 20 and 25° C. Cool, rainy spring weather in Switzerland in 1951 hindered emergence, and well timed spray applications based on local warning services gave very good control throughout the country. Weather and infestation records for 1951 are compared with those of earlier years.

2393. Sacantanis, K.
Études et observations sur les substances attractives pour *Ceratitis capitata*. **(Substances attractive to the Mediterranean fruit fly.)**
C.R. Acad. Agric. Fr., 1952, **38**: 53-5, bibl. 11.
A method of using fly traps baited with various substances for the control of the fruit fly or for estimating its numbers is described. Data recorded show that pear juice was the most effective substance used for capturing the flies but that the numbers killed were highest with an ammoniacal soap, " Clensel ", at 4% in water. The relative numbers of females to males captured varied with the attractant; with Clensel the proportion was 0·61 to 1, with pear juice 1·24 to 1.

2394. Anthon, E. W., and Wolfe, H. R.
Leaf hoppers increasing problem on cherry trees.
Bett. Fruit, 1951, **46**: 4: 8, 16.
At Wenatchee, Washington, 2 lb. of DDT, 50% wettable powder in 100 gal. and 1 lb. of 25% parathion gave good control of leafhoppers *Erythroneura dolosa* and *E. plena* attacking cherries.

2395. de Brouwer, W. M. T. J.
De pruimebladgalmug (*Dasyneura tortrix* Loew.) bij kaspruimen en haar bestrijding. **(The plum leaf curling midge on glasshouse plums and its control.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1952, **15**: 145-56, bibl. 8, illus.
This midge was first noticed on plums in the South-Holland glass district in 1948, when it attacked varieties of plum mostly grown under glass. Peaches interplanted with infested plums were only very lightly attacked. The midges lay their eggs at the tips of the shoots and the larvae destroy the growing points of apical and axillary buds, thus causing very stunted and crowded growth. When the larvae are fully grown they leave the shoots and pupate in the soil. Four or five generations may develop annually on plums under glasshouse conditions. If 1 kg. of 5% BHC per acre is mixed with the top few inches of soil about a month before blooming the attack will only be slight. Dusting the leaves with DDT or using parathion as a spray or dust will give good control if applied frequently (e.g. 6 times a fortnight).

2396. Groves, J. R.
Supplementary measures for the control of codling moth, *Cydia pomonella* (L.).
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 173-8, bibl. 6.
Evidence is presented which shows that packing sheds and apple boxes in which codling moth larvae hibernate may form focal points of infection to nearby orchards. In such cases it is suggested that, in addition to normal lead arsenate sprays, additional applications should be made at probable points of infestation, packing sheds and box stacks should be sprayed with DDT late in May, tree banding and scraping might be adopted, and infested fruit should always be disposed of promptly.

2397. Bachmann, F.
Versuche zur Bekämpfung der Obstmade. **(Trials on the control of codling moth.)**
Schweiz. Z. Obst- u. Weinb., 1952, **61**: 71-5.
In trials conducted in 4 apple orchards in Switzerland against codling moth, a spray schedule consisting of 2 applications of 20 g. Aralo, containing 15% parathion, in 100 l. was found superior to similar treatment with lead arsenate. Where the infestation is very severe a third parathion application is thought desirable.

2398. Talhouk, A. S.
A note on *Blastodacna libanotica* Dkff. (Lepidoptera: Cosmopterigidae).
Bull. Soc. Fouad Ier Ent., 1948, **32**: 41-5, bibl. 2, illus., from abstr. in *Rev. appl. Ent.*, 1952, **40**: 20.
Galls collected on pear twigs near Beirut (Lebanon) in 1938 were found to be caused by *Blastodacna libanotica*. The adults emerge in February and March, the males usually 3-4 days before the females. The newly hatched larvae bore upwards in the twigs of the current season, entering through the internodes, and their movements and the manner in which the galls develop as a result of their feeding are described. Each larva causes a separate gall, which bulges towards one side in the lower half and towards the other in the upper half; owing to their small size and their position, the galls remain inconspicuous until the leaves fall in autumn when the larvae have pupated in them.

2399. Dicker, G. H. L., and Briggs, J. B.
A note on the small ermine moth, *Yponomeuta padella malinella* Zell.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 172-3, bibl. 3, illus.
Spraying trials on apples showed that, whereas winter washing with DNC-petroleum oil gave complete control of the small ermine moth, the replacement of winter washing by green cluster applications of 0·1% DDT, 0·1% BHC or 0·01% parathion allowed the moth to become established.

2400. Bachmann, F.
Möglichkeiten für die Bekämpfung der Miniermotte. (Possibilities for the control of apple leaf miner.)
Schweiz. Z. Obst- u. Weinb., 1952, **61**: 75-7.
Grapol (20% nicotine) applied in 0·3 to 0·5% concentration during oviposition was found effective against the apple leaf miner in Switzerland [see also *H.A.*, 22: 373]. Two parathion (Aralo) applications also gave good control, and could be used in combination with scab treatment.

2401. Anthon, E. W.
Sprays for the fruit tree leaf roller.
J. econ. Ent., 1951, **44**: 995, being *Sci. Pap. Wash. St. agric. Exp. Stats.* **990**.
Studies on the control of fruit tree roller, *Archips argyrospila*, infesting cherries in Washington, showed DDT or parathion applied at the shuck stage to be outstandingly effective.

2402. Pielou, D. P., and Glasser, R. F.
Selection for DDT resistance in a beneficial insect parasite.
Science, 1952, **115**: 117-18, bibl. 4, being *Contr. Div. Ent., Sci. Serv., Dep. Agric., Ottawa* **2872**.
Promising results have been obtained in selective breeding for DDT resistance in *Macrocentrus ancylivorus*, an effective parasite of larvae of the oriental fruit moth, *Grapholitha molesta*.

2403. Stewart, W. S., Gammon, C., and Hield, H. Z.
Deposit of 2,4-D and kill of wild grape vines by helicopter spray application.
Amer. J. Bot., 1952, **39**: 1-5, bibl. 4, illus., being *Pap. Calif. Citrus Exp. Stat.* **697**.
In an attempt to control the spread of the western grape leaf skeletonizer (*Harrisina brillians*), a campaign has been organized in San Diego County, California, to eradicate its wild host, *Vitis girdiana*. As this wild grape vine often grows in almost inaccessible canyons, experiments were carried out on the application of 2,4-D by helicopter. The results were promising, but complete kill would require a greater deposit of 2,4-D than was obtained in these tests. Canopies of foliage over the vines failed to exclude killing amounts of 2,4-D. The isopropyl ester of 2,4-D in a petroleum solvent spray was apparently more effective than a water spray containing 2,4-D as the triethanolamine salt.

2404. Dicker, G. H. L., and Briggs, J. B.
Results of some experiments to control winter moth and tortricid larvae on apple.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 169-71, bibl. 2.
In spraying trials during 1949 and 1950 against the winter moth, *Operophtera brumata* (L.), and various species of tortricid, equally effective control was obtained by using 4% DNC-petroleum during the first half of March or 0·05% DDT added to the green cluster lime-sulphur spray. Addition of 0·1% DDT to the winter wash did not increase control. In 1950, 0·005% parathion was very effective when applied at the green cluster stage, but less so in 1949 at 0·01%. [Authors' summary.]

2405. Groves, J. R.
A preliminary account of the summer fruit tortricid.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 152-4, bibl. 8, illus.
Adoxophyes orana (F.R.) (=*Capua reticulana* (Hb.)) was first recorded in Britain in 1950, and has since been found infesting many pome and stone fruit orchards, especially apples, in Kent. The moth, its life history and the damage caused by its larvae are described. [See also *H.A.*, 22: 1435.]

2406. Goguadze, M. N.
Thiophosphate—a new spray against grape leaf roller. [Russian.]
Vinodelie i Vinogradarstvo, 1952, No. 2, pp. 45-6.
Thiophosphate gave 100% control of grape leaf roller (*Tortrix* sp.) in both laboratory and field trials. It was also found effective against mealybugs and spider mites attacking vines. The danger of this preparation to beneficial insects including bees, predators and parasites is mentioned.

2407. Gough, H. C.
The tortrix *Cnephasia longana* on fruit trees in Essex.
Plant Path., 1952, **1**: 31, bibl. 3, illus.
Slight injury to apple shoots at St. Osyth, Essex, in 1949, with a much more serious attack in June 1951 were due to caterpillars of *Cnephasia longana*. This tortrix has not hitherto been recorded as a pest of fruit trees in England.—N.A.A.S., Cambridge.

2408. Refatti, E.
Prove di lotta invernale sulle uova di *Cacoecia rosana* L. **(Winter trials against the eggs of *Cacoecia rosana*.)** [English summary 2½ lines.]
Not. Mal. Piante, 1951, No. 17, pp. 6-13.
In Italy all varieties of apple are attacked by the tortrix moth, *Cacoecia rosana*. Notes are given on its distribution and habits. Satisfactory ovicidal effects were obtained with mineral oils activated with dinitrocresol and also with mixtures of mineral oils and anthracene oils.

2409. Summers, F. M.
Tests of new materials to control peach twig borer on almonds and peaches.
J. econ. Ent., 1951, **44**: 935-9, bibl. 2.
Of the materials tested to control the peach twig borer, *Anarsia lineatella*, in California, parathion, DDT and a new dinitro phenol compound (triethanolamine dinitro-o-sec. butyl phenate) appeared to be possible alternatives to basic lead arsenate. The most effective methods of application were investigated.

2410. Böhm, H.
Ein neuer Schädling in Österreich (*Hyphantria cunea*] Drury [Lep., Arctiidae]). **(An insect pest new to Austria, *Hyphantria cunea*.)** [English summary 9 lines.]
PflSch. Ber. Wien, 1951, **7**: 177-89, bibl. 9, illus.
The fall webworm, first observed in Austria in 1951, caused considerable damage to a wide variety of plant species including tree and soft fruits, vegetables,

flowering shrubs, shade trees and weeds. In laboratory trials DDT, BHC and parathion dusts gave good control of the first stage of the larvae, but were found less effective against developed stages.

2411. Müller, F. P.
Die Wirkung von Hexa- und Estermitteln auf Reblauseier. **(The action of BHC and thiophosphoric ester preparations on phylloxera eggs.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1951, **5**: 203-6, bibl. 6.
Phylloxera eggs were dipped for periods of 3 to 48 hours in emulsions of BHC and thiophosphoric ester preparations, which proved ineffective.—Naumburg branch of the biol. Zentralanst. f. Land- u. Forstw.

2412. Sterling, C.
Ontogeny of the phylloxera gall of grape leaf.
Amer. J. Bot., 1952, **39**: 6-15, bibl. 31, illus.
Anatomical aspects of the development of the phylloxera gall on the leaf of the grape vine (*Vitis vulpina* L.) were studied and are here discussed. Development in the phylloxera gall is compared with that in other types of gall.—Univ. Calif.

2413. Robert, P.
La cochenille ronde du mirabellier: *Eulecanium corni* B. dans l'est de la France. **(The brown scale in eastern France.)**
C.R. Acad. Agric. Fr., 1952, **38**: 56-9, bibl. 3.
The distribution of the brown scale in Europe is reviewed, and details of two severe infestations in east France are given, one on mirabelle plums in Lorraine, and the other on robinias (*Robinia pseudacacia*) at Turckheim in Alsace. A comparison of these outbreaks shows that (1) the populations of the scale vary greatly in intensity on the same host plant in the same region, (2) the populations vary on the different host plants in the same district, and (3) *Eulecanium corni* is a secondary parasite which may sometimes develop abundantly. Plants acquire a resistance or susceptibility to the pest according to their environment and their physiological condition.

2414. Caballero V., C.
Notas biológicas y económicas sobre la conchuela negra (*Saissetia oleae*). **(Notes on the biology and economic importance of the olive black scale.)** [English summary ⅓ p.]
Agric. téc. Chile, 1951, **11**: 54-63, bibl. 5, illus.
A study is reported on the biology, parasitism and chemical control of the olive black scale in Chile. Chemical control with 1·5–2·0% of mineral oil in winter has proved satisfactory. Biological control by *Scutellista cyanea* has not so far been successful.

2415. Caballero V., C.
Aspectos biológicos y de control de la "conchuela morada del manzano". **(Biology and control of the oyster shell scale of apples.)**
Agric. téc. Chile, 1951, **11**: 91-2.
Observations on the biology of the oyster shell scale (*Lepidosaphes ulmi*) on apples and pears in Santiago, Chile, are recorded. Winter spraying with mineral oil has not given satisfactory control. Excellent results, however, were obtained with a summer oil spray (1·5–2·0% Sovaspray No. 1) in mid-October just after the larvae had emerged.

2416. Brimblecombe, A. R.
Control of red scale on figs.
Qd agric. J., 1951, **73**: 283-5, illus.
The life history of the scale, *Aonidiella aurantii*, in Queensland is outlined; there may be 4 or 5 generations in a year. A late winter lime sulphur spray, 1 in 15, is of some value in its control, but summer sprays of white oil, 1 in 40, are preferable during the summer months. Two applications with an interval of 2 or 3 weeks are necessary.

2417. Thiem, H.
Die San José-Schildlausgefahr und ihre Überwindung. **(The San José scale danger and how to overcome it.)**
Agrarwiss. u. Agrarpolitik, Cologne, **15**, 1951, pp. 88, bibl. 15, illus., from abstr. in *Rev. appl. Ent.*, 1952, **40**: 52.
In view of the outbreak of the San José scale [*Quadraspidiotus perniciosus*] on fruit trees and bushes in south-western Germany, this booklet has been compiled to give growers information on its control. Measures applicable at various times of the year and the insecticides that are effective against it are reviewed, a programme of sprays is outlined, and a list is given of its food-plants, with indications of their importance.

2418. Schaerffenberg, B.
Abflammversuch gegen die St. José-Schildlaus. **(Flame thrower experiments for the control of St. José scale insect.)**
Z. PflKrankh., 1951, **58**: 410-12, bibl. 3.
Tests are described in which a flame-thrower was used for the control of St. José scale on vines. The results showed some promise on the older vines, but the damage to young vines was too serious for the method to be recommended at present as a substitute for winter spraying.

2419. Refatti, E.
Esperienze di lotta invernale contro la cocciniglia violacea degli alberi da frutto (*Parlatoria oleae* Colvée). **(Winter trials for the control of *Parlatoria oleae* on fruit trees.)** [English summary 2 lines.]
Not. Mal. Piante, 1951, No. 17, pp. 1-6.
In recent years this pest has been troublesome not only in the southern and insular regions of Italy but also in the more central and northern areas. It may infest apple, pear, peach, almond, plum, olive and other trees. In the trials described satisfactory control was obtained with mineral oils activated with 4% dinitrocresol, and also with anthracene oils.

Other pests.

(*See also* 2452n.)

2420. Thompson, H. V., and Armour, C. J.
Rabbit repellents for fruit trees.
Plant Path., 1952, **1**: 18-22, bibl. 14, illus.
Four possible rabbit repellents were compared in a randomized trial on newly planted E.M. II apple rootstocks. The repellents were applied by paint brush on 15 November and damage recorded weekly

to 27 February. A high degree of protection was afforded by resin-ethanol made by adding 8 lb. commercial resin (colophony) to 1 gal. denatured ethyl alcohol. Bone-oil was slightly less effective, and rabbit repellent 96A significantly less so. The deer repellent ZDC, which is claimed also to repel rabbits, gave no protection.—Infestation Control Div. Lab., Hook Rise, Tolworth, Surrey.

Soil fumigants.

2421. Dieter, C. E.
Soil fumigation.
Amer. Fruit Gr., 1952, **72**: 3: 28-9, illus.

Methyl bromide in solution and chloropicrin are recommended for small-scale applications in seed- and plant-beds, greenhouses and potting soils, whereas for large-scale field treatments of vegetable and orchard soils ethylene dibromide formulations or a dichloropropene-dichloropropane [D-D] mixture should be used.

Fungicides.

(*See also* 2452m.)

2422. Schmidt, H.
Laborschnelltest zur Fungizidprüfung. **(A quick test method for fungicides in the laboratory.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1951, **5**: 208-11, bibl. 6, illus.

Septoria apii on artificially infected celery leaves kept in Petri dishes was used as the test fungus. Results were available within a fortnight, independent of time of year or the occurrence of spontaneous infection. These tests are designed to give preliminary information on the fungicidal action of a compound but not as a substitute for field trials.—Biol. Zentralanst., Berlin.

2423. Drummond, O. A.
Um metodo simples e eficiente para o estudo de fungicidas para pulverizações preventivas em folhas. **(A simple and efficient method for determining the efficiency of fungicides as protective sprays.)** [English abstract 4 lines.]
Lilloa, 1949, **21**: 57-9, illus [received 1952].

Young tomato plants kept under standard conditions are sprayed with the fungicides and later with a suspension of the conidia of *Septoria lycopersici*. The killing power of the fungicides is then compared with a standard reference.

2424. Keil, H. L., Horsfall, J. G., and Rich, S.
Relation of laboratory ED50 to field performance of fungicides.
From abstr. in *Phytopathology*, 1952, **42**: 113.

During the past three years a number of miscellaneous organic compounds have been field-tested as protectants against apple scab, bean anthracnose, and other diseases. In general, the field performance of these materials, particularly in relation to their resistance to removal by rain, was directly related to their laboratory ED50 values. Of the two test organisms employed *Sclerotinia fructicola* appeared to be more efficient for finding protectants against apple scab, whereas *Stemphylium sarcinaeforme* seemed better for bean anthracnose.

2425. Moore, M. H.
An intensive field method for testing fungicides for apple trees.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 139-47, bibl. 10, illus.

In the method described the following stimuli to natural infection by the apple scab fungus, *Venturia inaequalis*, were provided: (1) Apple rootstock M.III was used as the susceptible host and pruned to provide a sequence of young shoots in May, June and July. (2) Dead apple leaves were air-dried when ascospores in them were mature so that natural ascospore inoculum should be available when required. (3) The natural environment was modified by providing liberal irrigation and by erecting hop-lewing wind shelters to keep air humidity as high as possible. By this means it was possible to promote severe scab-infection of the foliage on 1-year-old shoots in May, on current-year shoots in June and on secondary shoots in July. The method is not infallible, but is of value in supplementing laboratory and greenhouse methods before making quasi-commercial tests in the orchard.

2426. Moore, M. H., and Kirby, A. H. M.
Can the new organic fungicides help the fruit-grower ?
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 200-4.

In a general account for growers the results obtained with the chief organic fungicides now under test at East Malling against apple scab and mildew are reviewed. They include dithiocarbamates and sulphenamides, which contain sulphur, and several compounds that contain no sulphur. They are compared for efficiency, safety and sulphur consumption with standard lime-sulphur and elemental sulphur sprays.

2427. Schmidt, H.
Vorläufige Mitteilung über die fungizide Wirksamkeit E-mittelhaltiger Mischbrühen. **(A preliminary communication on the fungicidal action of mixed sprays containing E-605.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1951, **5**: 224-6, bibl. 2.

In laboratory trials spray mixtures of certain E-605 preparations with the fungicides Cupral and Fuklasin were found to be effective against the test fungus *Septoria apii* (see *H.A.*, 22: 2422). No spray damage occurred when these mixtures were applied to roses and other ornamentals. Certain other E-605 compounds as well as fungicides of the polysulphide type proved unsuitable for combined application.—Biol. Zentralanst. f. Land- u. Forstw., Berlin.

2428. Rader, W. E., Monroe, C. M., and Whetstone, R. R.
Tetrahydropyrimidine derivatives as potential foliage fungicides.
Science, 1952, **115**: 124-5, bibl. 2.

Preliminary laboratory studies and greenhouse tests on vegetables suggest that the alkyltetrahydropyrimidines possess high fungistatic value and merit further testing as foliage fungicides.

2429. WENZL, H.
Beitrag zur Methodik der Prüfung von Baumpflegemitteln. **(Methods of testing wound-dressings.)** [English summary 4 lines.]
PflSch. Ber. Wien, 1951, **7**: 145-58, bibl. 3, illus.

Handler's " Rindenfenster " method has been simplified and improved. The pelargonium leaf method proved unreliable.

Insecticides.

(*See also* 2452e, 2845, 2847, 2849h, i, r.)

2430. MERTIN, J. V.
Pesticides. A review of their uses, properties and hazards.
[*Publ*]. *Commonw. Aust. Dep. Health*, Adelaide, 1951, pp. 123, bibls.

The author reviews literature available on insecticides, fungicides, weedicides and rodenticides with particular reference to the hazards to human health involved in their use, the information dealing mainly with medical aspects of insecticides. Most of the voluminous literature issued since 1945 has been examined including some 800 different articles. A list of journals and other publications consulted together with a restricted bibliography of the more important articles is given. Supplements are promised [see 2445].

2431. PAGE, A. B. P., AND BLACKITH, R. E.
Control of pest infestation.
Reps Progr. appl. Chem., 1949, **34**: 649-84, bibl. 217 [received 1952].

The limitations of DDT and consequent revival of interest in the older natural products, pyrethrum and rotenone, are recorded. Recent work on the synthesis of pyrethrums is noted. The phytotoxicity and effect on beneficial insects of DDT and BHC are discussed. The development of insecticide-resistance, the relationship between toxicity and chemical structures and recent work on acaricides and fumigants are reviewed.

2432. MICHIELS, A., AND FAILLET, P.
Comparaison de l'action insecticide de contact des émulsions de D.D.T. et de chlordane. **(A comparison of contact insecticidal action of emulsions of D.D.T. and of chlordane.)**
Parasitica, 1952, **8**: 17-27, illus.

A laboratory method is described by which small differences between persistent insecticides may be detected. Purified chlordane is distinctly more active than the technical product both from the point of view of immediate effect and of its persistence. DDT has a distinct synergistic action on technical chlordane. The action of the mixture at the time of its use or soon after is almost equal to that of pure chlordane, but the persistence of the latter is superior. The action of DDT shows no great difference from that of technical chlordane. The loss in effectiveness of DDT in respect of its duration is more regular than that of chlordane.—The Belgian Chemical Union, La Hulpe.

2433. ROGOFF, W. M., AND METCALF, R. L.
Some insecticidal properties of heptachlor.
J. econ. Ent., 1951, **44**: 910-18, bibl. 26.

Data accumulated on the insecticidal action of heptachlor during the past few years show, among other things, that the compound is effective against fruit fly (*Drosophila melanogaster*), oriental fruit fly (*Dacus dorsalis*), walnut husk fly (*Rhagoletis completa*), fruit leaf roller (*Archips argyrospila*), vegetable weevil (*Listroderes costirostris obliquus*) and greenhouse thrips (*Heliothrips haemorrhoidalis*), but ineffective against California red scale (*Aonidiella aurantii*) and citrus red mite (*Paratetranychus citri*).

2434. SELLKE, K.
Insektenbekämpfungsversuche mit E-Brühen und ihren Gemischen mit pilztötenden Zusätzen. **(Experiments on insect control with E-605 sprays applied separately and mixed with fungicides.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1951, **5**: 221-4, bibl. 4.

The insecticidal, especially aphidicidal, action of certain E-605 preparations against apple pests was not affected by the addition of copper oxychloride sprays, even if the mixtures were left to stand for 3 days. Mixtures of the insecticide with fungicides of the polysulphide type, however, had to be used when fresh. In another series of trials BHC proved much superior to E605 for the control of the green apple aphid.—Biol. Zentralanst. f. Land- u. Forstw., Berlin.

2435. ANTHON, E. W., AND BURTS, E.
Systemic insecticides for controlling aphids and mites.
Proc. 47th annu. Mtg Wash. St. hort. Ass. 1951, pp. 63-6.

The systemic insecticides Systox, Pestox and E-20-58 all showed good control of mites and aphids on peach and cherry. The most suitable method of application, duration of effectiveness, effects on the roots and the possible toxicity of treated fruits are yet to be determined.

2436. (RIPPER, W. E.)
" Isopestox ": a new insecticide.
Chem. Ind. Lond., 1951, No. 7, p. 123.

A brief account of a talk on the properties of the systemic insecticide bis *iso*propylaminofluorophosphine oxide, which can be applied to the roots and is claimed to be only a little more than twice as toxic as DDT and 26 times less toxic than parathion to mammals.

2437. RIEDEBURG, T.
Compound A42—arsenomethane As-1, 2 disulfide, a new organic arsenical insecticide.
Agric. Chemls, 1952, **7**: 52-3, 131-3, bibl. 4.

The compound showed promise against several test insects, including the Mexican bean beetle and the colorado beetle. Data on phytoxicity to potato, vegetables and deciduous fruit trees are also tabulated. If further trials warrant it, the chemical will be put on the market.

2438. SMIRNOVA, A. A.
New wetters for use in spraying with contact insecticides and acaricides. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1952, **17**: 2: 19-22.

Substances known as DB, OP-7, OP-10 and sulphanol have high wetting properties when used with contact insecticides. They are very effective against insects protected with a waxy covering, such as the cabbage

aphid, the comstock mealy bug, wood-boring larvae, and scale insects. The optimum concentration of the wetter against such insects is 0·1%. The use of such active wetters reduces the necessary concentration of the insecticide and lessens spraying costs. These wetters are particularly effective when used with anabasin and nicotine preparations and with colloidal sulphur.

2439. Heath, D. F., Lane, D. W. J., and Llewellyn, M.
Studies on commercial octamethylpyrophosphoramide. III. Decomposition of the insecticide in plants, using 32p as a tracer.
J. Sci. Food Agric., 1952, **3**: 60-9, bibl. 14.

Strawberries, sugar beet, hops and brussels sprouts were sprayed with the insecticide Pestox III consisting of a radioactive mixture of octamethylpyrophosphoramide and its higher homologue. On analysing the sprayed crops it was found that the concentration of both constituents in all the plants fell at much the same rate, provided they were treated at the same time of the year. The rate slowed somewhat, however, as the year progressed from May to September, and became very slow in October. It was also shown that the plants decomposed the insecticide, and it is likely that practically the whole lowering of concentration with time is due to this decomposition. [From authors' synopsis.]

2440. Heath, D. F., Lane, D. W. J., and Llewellyn, M.
Studies on commercial octamethylpyrophosphoramide. IV. The decomposition of pyrophosphoric acid tetra (dimethylamide) and orthophosphoric acid tri(dimethylamide) in the living plant.
J. Sci. Food Agric., 1952, **3**: 69-73.

Octamethylpyrophosphoramide and tri(dimethylamino) phosphine oxide applied to sugar beet and strawberries decomposed at similar rates in both plants.

Spraying methods.

(*See also* 2122, 2452p, u, v, 2515.)

2441. Borden, A. D.
Spray chemical concentrations.
Calif. Agric., 1952, **6**: 1: 11-13.

The methods of applying sprays to deciduous fruit trees in bulk, semi-concentrate and concentrate forms is compared, and a table presented setting out the gallonage and amounts of material needed per acre by each method for 6 tree populations ranging from 55 to 134 trees per acre.

2442. Vrijhof, B.
Resultaten van het vernevelen in Zeeland in 1951. **(Results of mist spraying in Zeeland in 1951.)**
Fruitteelt, 1952, **42**: 121-4, 126, 186-8, 208-9.

An account is given of results obtained in Dutch orchards where low volume "mist" spraying was applied to apple trees, using various insecticides and fungicides against a number of pests and against apple scab. The costs of materials and their application are tabulated. The results when compared with ordinary spraying were rather variable but fairly encouraging. One great advantage is that less water is required, fresh water being costly, since in Zeeland most of the canals contain, at least in summer, enough salt to cause the risk of spray injury.

2443. Bieri, F.
Versuche zur Leistungssteigerung beim Bespritzen der Obstbäume. **(Trials to increase efficiency in spraying fruit trees.)**
Schweiz. Z. Obst- u. Weinb., 1952, **61**: 147-51, illus.

Scab control trials conducted in and near Oeschberg, Switzerland, during 1951 have shown once more that correct timing and thorough application are more important for successful operations than type of treatment used. The use of concentrated sprays is not recommended in ordinary motor sprayers, nor that of mist blowers on steep ground.

2444. Zäch, C., and Kundert, J.
Versuche über Spritztechnik und Wirkstoffverlust. **(Investigations on the technique of applying copper sprays and on the loss of active agent.)**
Schweiz. Z. Obst- u. Weinb., 1952, **61**: 151-5, bibl. 1.

A motor sprayer and a mist blower were compared in an experiment at Wädenswil in which 10 apple trees were treated with a copper carbonate preparation at the rate of 22 g. Cu per tree. The loss of copper through drip and wind dispersal amounted to 17·9% when applied with the motor sprayer, and 23·4% with the mist blower.

Spray damage and residues.

(*See also* 24521.)

2445. Anon.
Pesticides Quarterly Supplement.
Pesticides quart. Suppl. Commonw. Aust. Dep. Health, 1952, No. 1, pp. 125-38, bibl. 20, illus.

Following the issue of a comprehensive bulletin in November 1951 [see 2430] it was decided to issue periodic supplements to keep persons concerned with the medical and agricultural aspects of pesticides informed of new developments. The first of these supplements deals mainly with administrative measures, hazards, toxicities, residues and precautionary measures, and the uses of the compounds are mentioned only where they are considered relevant.

2446. Llewelyn, F. W. M., and Allen, M.
A method of estimating scorch on leaves.
A.R. East Malling Res. Stat. for 1951, 1952, A35, pp. 115-18, bibl. 3.

A method of measuring scorch on raspberry leaves due to ammonium thiocyanate sprays is described; it involves measurement of the fresh weight and oven dry weight of treated leaves and suitable controls. A linear relation between the probit of the percentage damage and the logarithm of the concentration of thiocyanate applied is shown to exist when the spray is applied to the upper or lower surface of the leaf. Extensions and limitations of the method are discussed. [Authors' summary.]

2447. Llewelyn, F. W. M., and Allen, M.
The effect of wetter concentration on ammonium thiocyanate damage to raspberry leaves, and on the volume of spray required to achieve complete wetting.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 119-21, bibl. 3.
Individual leaflets of potted raspberry plants were sprayed on their lower surfaces with an ammonium thiocyanate solution containing various concentrations of a wetting agent. The volume of spray per unit dry weight of leaf needed to cause complete wetting of the leaf decreased with increasing wetter concentration, but the proportion of leaflet damaged was unaffected. It is assumed that there is no interaction between Agral LN. and ammonium thiocyanate on raspberry leaves, and that, for densely hairy leaves, over the range of concentrations tested, the volume of spray retained by the leaf is substantially unaffected by the wetter concentration. [Authors' summary.]

2448. Kirby, A. H. M., and Bennett, M.
Spray damage investigations in 1949-51.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 183-6, bibl. 1.
Many tests for phytotoxicity on new spray materials and mixtures applied to apples and pears are reported for 3 seasons. In tests in one season no damage occurred from HETP on gooseberries or from toxaphene on plums. A case of damage to apple leaves is recorded in which a wetter used with lead arsenate apparently released copper from a bordeaux deposit already on the leaves.

2449. Byrde, R. J. W., and Woodcock, D.
Fungicides and phytotoxicity.
Nature, 1952, **169**: 503-4, bibl. 3.
The fungicide 2 : 3-dichloronaphthaquinone and related compounds were tested for phytotoxicity on varieties of plum, tomato and broad bean at Long Ashton, and the results obtained are discussed. They suggest that esterification may be a useful means of reducing phytotoxicity.

2450. Mackay, J. H. E.
Actidione treatment of cherry fruit.
J. Aust. Inst. agric. Sci., 1951, **17**: 216-17, bibl. 9.
The extent of the phytotoxicity of the antibiotic actidione (cycloheximide), which is a possible spray for cherry leaf spot control, varies with species and variety. In this investigation, actidione used as a spray and post harvest dip had no phytotoxic effects on cherry fruit; ripening on the tree was normal and keeping quality and flavour were not affected. A.C.S.

2451. Kirby, A. H. M., and Bennett, M.
An effect of phenyl mercury chloride on pear leaves.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 187-8, bibl. 1, illus.
Damage to leaves of 10 varieties of pear following post-blossom sprays of mercurated lead arsenate was reported in 1951, but not in 1950. In 1951, similar damage followed one application of phenyl mercury chloride on china clay or on lead arsenate to leaves of Conference. In the case of PMC on clay at 0·01%, the chlorophyll was reduced by over 30%. Leaf-fall did not occur. [Authors' summary.]

Noted.

2452.

a Anon.
Spray recommendations for tree fruits in eastern Washington.
Ext. Bull. Wash. St. agric. Exp. Stat. **419**, revised 1952, pp. 44.

b Borden, A. D., and Madsen, H. F.
Stink bug on pears [*Euschistus conspersus*].
Calif. Agric., 1951, **5**: 11: 7, 12, illus.
Life history and damage caused.

c Commonwealth Institute of Biological Control (Thompson, W. R.).
A catalogue of the parasites and predators of insect pests. Section 2. Host Parasite Catalogue. Part II. Hosts of the Coleoptera and Diptera, 1951, pp. 147, obtainable from Commonwealth Agricultural Bureaux, Central Sales Branch, Farnham House, Farnham Royal, Slough, Bucks, England, price 10s.

d Costantino, G.
Peut-on combattre la mouche de l'olive ?
(Can one control the olive fly ?)
Fruits et Prim., 1951, **21**: 9-11, bibl. 8.
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Science, 1952, **115**: 245-6, bibl. 1.

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Powdery mildew of apple.
Punjab Fruit J., 1950, **14**: 48: 26-7.
And its control in the West Punjab.

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Punjab Fruit J., 1950, **14**: 48: 34-6.
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Evaluation of plant therapeutants.
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Insect pests and their control.
J. Dep. Agric. W. Aust., 1952, 1 (n.s.): 63-75, illus.

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Transmission of wilt and decline disease of cherries in Utah by the black cherry aphid [*Myzus cerasi*].
Plant Dis. Reptr, 1951, **35**: 349-50, bibl. 7.

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Transmission of western X-disease virus from chokecherry to peach by *Colladonus geminatus* (van D.).
Plant Dis. Reptr, 1951, **35**: 347, bibl. 3.

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A method for determining insecticide residues per unit of leaf surface.
J. econ. Ent., 1951, **44**: 1026-7, bibl. 1.

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Dibutyl-naphthalin-sulfosaures Natrium, ein neues Fungizid. **(Dibutyl-naphthalene sodium sulphonate, a new fungicide.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1951, **5**: 145-8.

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From arsenic to warfarin—the story of rodenticides.
Agric. Chemls, 1952, **7**: 46-8, 135-43, illus.

o LOEWEL, E. L.
Vorschläge für die Schädlingsbekämpfung 1952 verbunden mit einem Spritztagebuch. **(Suggestions for disease and pest control in 1952 together with a spray calendar.)**
[*Publ.*] *ObstbVersuchsring Jork*, 1952, pp. 32.

p MARSHALL, J.
Nozzle abrasion in orchard spray applicators.
Sci. Agric., 1951, **31**: 470-4.

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Principles underlying plant import and export regulations.
Plant Path., 1952, **1**: 15-17.

r NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING.
Preliminary trials with an Evans frost guard.
Tech. Memo. N.I.A.E. **23/1037/49**, 1950, pp. 9, [not for publication], [received 1952].

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Orchard mites becoming resistant to parathion.
Proc. 47th annu. Mtg Wash. St. hort. Ass. 1951, pp. 67-9.

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Survey for X-disease on peach and cherry in New York, including the first report on sweet cherry.
Plant Dis. Reptr, 1951, **35**: 256-8, bibl. 2.

u POTTS, S. F., AND GARMAN, P.
Concentrated sprays for application by mist blowers for control of forest, shade and fruit tree pests.
Circ. Conn. agric. Exp. Stat. **177**, 1950, pp. 19.
Sixty-five formulae are given.

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Construction and operation of ground equipment for applying concentrated sprays.
Circ. Conn. agric. Exp. Stat. **178**, 1950, pp. 35, illus.

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Soppsjukdommer på epplefrukt. **(Fungus diseases of apple fruits.)**
Frukt og Baer, 1951, **4**: 79-94, bibl. 17, illus.

x ROGERS, W. S.
Protection from spring and autumn frosts by continuous water sprinkling.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 197-8, bibl. 2, illus.
Reprinted as a bulletin for fruitgrowers [see *H.A.*, 22: 1324].

y STEPHENS, J. M.
Disease in codling moth larvae produced by several strains of *Bacillus cereus*.
Canad. J. Zool., 1952, **30**: 30-40, bibl. 9.

z STOLL, K.
Über die Symptôme und Bekämpfungsmöglichkeiten von Viruskrankheiten an Kirschbäumen. **(Symptoms and control of virus diseases on cherries.)**
Schweiz. Z. Obst- u. Weinb., 1952, **61**: 63-7, illus.

WEEDS AND WEED CONTROL.

General.

(*See also* 2276, 2403, 2942.)

2453. N.C. WEED CONTROL CONFERENCE RESEARCH COMMITTEE.
Recommendations of the Research Committee of the NCWCC for 1951.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 127-32.
The recommendations made include herbicidal treatments of specific weeds, weed control in asparagus, beans, beets, carrots, celery, dill, parsnips, parsley, onions, potatoes, sweet corn, strawberries, raspberries, grapes, apples, ornamentals, seedbeds and wasteland, and the control of woody plants.

2454. CRAFTS, A. S.
Chemical weed control.
Calif. Agric., 1952, **6**: 1: 4, 14.
A brief discussion of the advantages and problems of weed control by temporary soil sterilants, permanent soil sterilants and translocated herbicides.

2455. SWEET, R. D.
Chemical weeding of horticultural crops in the northeast.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., p. 18.
Among the more important results briefly reported are: In New York good control was obtained of all weeds growing between grape vines with contact spray emulsions combining heavy aromatic oils and dinitros. Stem sprays of oils gave excellent control of midsummer and autumn purslane and grasses in onions in a number of states. Autumn spinach has been successfully weeded with 3-chloro IPC plus oil.

2456. SHAFER, N. E., AND OTHERS.
Control of annual, winter annual and biennial weeds.
Res. Rep. 7th annu. N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 52-67.
The abstracts submitted are summarized in 2 sections and this is followed by a classification of weed responses.

Particular weeds.

2457. Bakke, A. L., and others.
Control of perennial herbaceous weeds.
Res. Rep. 7th annu. N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 1-51.

The following authors summarized the numerous results of investigations submitted on the control of individual weed species: Bakke, A. L.—Canada and perennial sow thistle, *Cirsium arvense* and *Sonchus arvensis*. Kratochvil, D. E.—Quack or couch grass, *Agropyron repens*. Fuelleman, R. F.—Johnson and Bermuda grass [*Sorghum halepense*] and [*Cynodon dactylon*]. Pavlychenko, T. K.—Leafy spurge, *Euphorbia esula*. Woestemeyer, V. W.—Field bindweed, *Convolvulus arvensis*. Coupland, R. T.—Hoary cress, *Lepidium draba*, Russian knapweed, [*Centaurea picris*] and other perennial herbaceous weeds. The report is concluded with a classification of perennial weed responses.

2458. Adams, R.
Some aspects in the cultural control of weeds.
J. roy. hort. Soc., 1952, **77**: 178-82, bibl. 5.

A plea for good husbandry is followed by notes on the eradication of horse tail, *Equisetum arvense*, and bracken [*Pteridium aquilenum*].

2459. Conway, E.
Bracken—the problem plant. A review of recent conclusions about its spread and dominance.
Scot. Agric., 1952 (Spring), pp. 181-4, bibl. 6, illus.

The common bracken is estimated to have invaded ½-1½ million acres in the west of Scotland, mainly in the Highlands, and the infestation of further areas is progressing. Control measures must be directed against the underground stems either directly by ploughing or indirectly by continually cutting away the fronds, thus exhausting the plant.

2460. Home, J. H. M.
Bracken control.
Scot. Agric., 1952 (Spring), pp. 184-9.

The paper is a review of work done on the Buccleuch Estates " based on records of performances, costs and results achieved in carrying out their bracken-cutting programme ". The expenditure involved in cutting the bracken twice for the first two years and once in the third year is considered a sound investment, though the operation may have to be repeated after 15-20 years. Finally the hope is expressed that science will find a way of utilizing the waste material, for instance as a source of potash.

2461. Klingman, G. C., and Ahlgren, G. H.
Effects of 2,4-D on dry weight, reducing sugars, total sugars, polysaccharides, nitrogen, and allyl sulfide in wild garlic.
Bot. Gaz., 1951, **113**: 119-34, bibl. 27, being *Pap. J. Ser. N. C. agric. Exp. Stat.* **370.**

In this study a monocotyledon, *Allium vineale*, was used to determine the effects of the herbicide 2,4-D on the physiology and chemical components of plants. The garlic was treated on 7 April, 1949, with the triethanolamine formulation of 2,4-D at the rate of 3 lb. acid equivalent per acre. Treatment reduced the rate of plant elongation and bulb development, but it is considered that an earlier application would be necessary for satisfactory control. On a weight-per-plant basis treated plants lost in dry weight, total sugars, total polysaccharides and total nitrogen. The quantity of allyl sulphide increased at nearly the same rate in treated and check plants until the fifth week, when it was reduced in treated plants. The reserve foods showed the greatest percentage of reduction. The trends suggest that with the death of the plant the reserve carbohydrates and reducing sugars would be nearly exhausted. Percentage of total nitrogen was higher in the treated than in the check plants, as a result of the greater resistance of the nitrogen fraction than the carbohydrate fraction to katabolism.

2462. Harris, V. C.
Maleic hydrazide as a herbicide on wild onions (*Allium canadense*).
4th Proc. south. Weed Conf., Memphis, Tennessee, 1951, pp. 106-7, bibl. 2.

Maleic hydrazide (30%) applied, in March 1950, at rates ranging from ½ to 4 gal. per acre showed excellent control of wild onion in all cases, but did not eradicate it from any of the plots. A 4 gal. treatment made in November 1949, however, resulted in nearly complete eradication.

2463. Tihovidova, V. K.
The control of dodder in vineyards. [Russian].
Vinodelie i Vinogradarstvo, 1952, No. 2, pp. 46-7.

Dodder (*Cuscuta* sp.) parasitic on grapevines inhibited growth, and the shoots produced were of inferior quality and did not mature before the onset of frosts. The sugar content of grapes was also reduced on vines attacked by dodder. Of the control measures tried, an application of sulphur dust, 100-150 g. per sq. m. of soil in the spring, was found the most effective and least harmful to the vines.

2464. Bohmont, D. W.
Halogeton—unwanted tenant of the West.
Circ. Wyo. agric. Exp. Stat. **48**, 1951, pp. 12, bibl. 1, illus.

Halogeton glomeratus is an annual weed belonging to the Chenopodiaceae. It is a native of the arid Caspian and the Salty Turkestan regions and is well adapted to the alkaline soils of the semi-arid parts of the western U.S. It is poisonous to livestock. Halogeton can be controlled by mechanical methods or by applying 2,4-D in the ester or amine formulation at the rate of 2 lb. per acre.

2465. Barabé, R.
La salicaire. **(Purple loosestrife.)**
Agriculture, Quebec, 1950, **7**: 356-60, illus.

The weed is making rapid progress in Canada where in some districts it covers wide areas. Promising results were obtained with 2,4-D.

2466. Derico, T. R.
Experimental control of cogon (*Imperata cylindrica* [Linn.] Beauv.), water hyacinth (*Eichhornia azurea* Kunth.), *Lantana camara* Linn., and other noxious weeds with 2,4-D and other herbicides.
Philipp. Agric., 1951, **34**: 189-201, bibl. 13, illus.

The results of a series of trials at the College of Agriculture, Los Baños, with 9 proprietary herbicides are described. *Imperata cylindrica*, especially when young, was killed by 12, 16 and 18% aqueous solutions of Ammate weed killer, applied once as a foliage spray at 4 l. to 7 sq. m. of land. Water hyacinths were killed in 3-4 weeks, without damage to the fauna in the water, by 2,4-D as 0·5, 1·0 and 1·5% aqueous solutions of Fernoxone, Esteron 44, 2,4-Dow weed killer, Du Pont 2,4-D 74% Amine weed killer and Du Pont 2,4-D. *Lantana camara*, *Maghania strobilifera* and *Blumea balsamifera* were killed in 2-3 weeks by a single application of 1·0, 1·5 and 2·5% aqueous solutions of Esteron 44 and Fernoxone. Mosaic infected abaca plants were killed by 2,4-Dow weed killer applied to the cut surfaces of pseudostems severed 30 cm. above the ground.

2467. Joshi, L. M., Pantulu, V. R., and Padmanabhan, S. Y.
Control of water hyacinth with hormone herbicides.
Indian Fmg, 1950, **11**: 545-6, illus.

A large measure of control was obtained with one, and complete eradication with two, applications of 2,4-D at rates of 10 lb. 10 oz. and 5 lb. 5 oz. of 70% acid in 900 gal. water per acre. Subsequently, similar results were obtained using the sodium salt of 2,4-D at 1 lb. 14 oz. in 150 gal. water per acre, the cost of the chemical for 2 applications being Rs. 18 per acre.

2468. Earle, T. T., Riess, K., and Hidalgo, J.
Tracer studies with alligator weed using 2,4-D-C^{14}.
Science, 1951, **114**: 695-6, bibl. 3, illus.

Alligator weed, *Alternanthera philoxeroides*, is a prolific weed of waterways in the Gulf coastal area. As 2,4-D is apparently less effective against it than against water hyacinth, C^{14} was used in a series of studies on the absorption and translocation of the herbicide. The procedure adopted is described, as are methods used to prepare radioautographs of histological sections. Greenhouse tests showed that 2,4-D-C^{14} reached its maximum distribution in about 8 hr. The average rate of upward travel was about 4·3 cm./hr. and the downward rate 4·2 cm./hr. The radioactive material reached the top of each plant, but only travelled downwards for 1 or 2 internodes.

2469. Gianfagna, A. J., and Pridham, A. M. S.
Some aspects of dormancy and germination of crabgrass seed, *Digitaria sanguinalis* Scop.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 291-7, bibl. 5.

The control of hairy crabgrass, *Digitaria sanguinalis*, a major weed in many parts of the U.S.A., is made difficult by its seeds germinating over long periods. The study described here throws light on the factors affecting dormancy and germination.—Cornell Univ.

2470. Burgis, D. S.
Nut grass control with 2,4-D.
4th Proc. south. Weed Conf., Memphis, Tennessee, 1951, pp. 24-5, bibl. 5.

The data presented show that the stand of nut grass in infested fields can be greatly reduced by three sprayings with 2,4-D (sodium 2,4-dichlorophenoxyacetic acid) at the rate of 5 lb. actual per acre. Repeated sprayings at yearly intervals should eradicate this pest. [Author's conclusions.]

Weed control in fruit and ornamental crops.

2471. Alban, E. K.
New developments in chemical weed control; fruits and ornamentals.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 64-7.

The limiting factors involved in the chemical weed control of horticultural crops are enumerated and advances in control among strawberries, grapes, brambles, apples, pears and stone fruits are described. Little research has been done in the case of ornamentals.

2472. Nylund, R. E., and others.
Control of weeds in small fruits and ornamentals.
Res. Rep. 7th annu. N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 126-32.

Abstracts received on herbicidal studies include 5 reports on strawberries, 2 on crabgrass control in turf, 2 on gladioli, one each on peonies and nursery stock and 3 on the control of quack grass in nursery plantings. *Strawberries:* In one trial, single pre-planting treatments of 2,4-D applied at 2 lb. per acre or 1 lb. as a summer spray gave satisfactory weed control with no apparent injury to strawberry plants; in another trial as little as ½ lb. seriously reduced runner production when applied 17 days after planting. Similar varying results are reported from experiments with other chemicals. *Turf:* PMAS and S-1998 controlled crabgrass and caused no or only slight damage to turf. *Gladioli:* Reports indicate that this crop is resistant to the action of herbicides. Chemicals effective in controlling weeds without injuring the gladioli when applied pre-emergence included 2,4-D, DNOSBP, PCP, Stoddard solvent fortified with PCP, TCA and methyl bromide. *Peonies:* Excellent control of broad-leaved weeds was obtained with DNOSBP and fair with 2,4-D without injury to the peonies. *Nursery crops:* Although TCA and PCP gave good weed control, they injured some of the young ornamentals.

2473. Pastac, I.-A.
Nouvelle application des colorants nitrés: désherbage chimique des vergers. (**A new application of DNC and its derivatives: as a chemical weedkiller in orchards.**)
Reprinted from *Chimie et Industrie*, 1952, **67**, No. 2 bis, pp. 3, illus.

The advantages of chemical treatment over mechanical cultivation for destroying orchard weeds are indicated. It is stated that a spring application of DNC as a herbicide destroys not only the weeds but also certain pests which hibernate on the ground or on the weeds and so escape the usual winter sprayings.

2474. Bryant, L. R., and Rasmussen, L. W.
The use of 2,4-D in orchard bindweed control.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 131-5, bibl. 6, being *Sci. Pap. Wash. St. agric. Exp. Stats.* **1032.**

In 2 series of trials in orchards heavily infested with bindweed, *Convolvulus arvensis*, various formulations of 2,4-D applied at 3 lb. acid equivalent per acre in the

autumn of 2 successive years following spring and summer cultivation reduced the stand of the weed though they did not eradicate it. No injury was caused to the apple trees by these autumn applications, but as the amine form of 2,4-D gave reasonable control of bindweed it is suggested that it should be used in preference to the more volatile esters. Studies on the action of 2,4-D on bindweed roots showed that it markedly increased their respiration rate during the dormant season, CO_2 evolution being increased nearly 5-fold in 2 months, and over 3-fold in 6 months, after treatment.

2475. HEWETSON, F. N.
New herbicides for controlling poison ivy in apple orchards.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 125-30, bibl. 14, being *Pap. J. Ser. Pa agric. Exp. Stat.* **1632**, and *Progress Rep. Pa agric. Exp. Stat.* **61**, 1951, pp. 6.

In trials in grassed orchards in Pennsylvania various formulations of 2,4,5-T alone or mixed with 2,4-D or soya bean oil or fuel oil effectively controlled poison ivy at much lower cost than ammonium sulphamate, which also gave satisfactory control. The time of application during the active growing season made little difference. Sodium chlorate was only partially effective, 2,4-D still less so and 2 dinitro compounds were completely ineffective. No injury to the trees was observed from any of the treatments.

2476. BRUNER, H. E.
Selective control of weeds in strawberries.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 60-1.

At the end of July 1950 30 formulations of 14 chemicals were applied to Premier strawberries in Ohio. On 31 August the best weed control was found in the Sulfasan plots, followed closely by NIX with F-49 somewhat behind. No injury to the strawberries was apparent in these plots and the weed control ran between 80 and 90%. Good results were obtained with Sulfasan in two further trials.

2477. HEMPHILL, D. D.
A comparison of certain chemicals with 2,4-D for weed control in strawberries.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., p. 60.

Several chemicals alone and combined with 2,4-D did not give better weed control than 2,4-D alone and they depressed runner production.

2478. WILSON, W. F., AND STAMPER, E. R.
Chemicals for weed control in strawberries.
4th Proc. south. Weed Conf., Memphis, Tennessee, 1951, p. 121.

Sprays of 2,4-D and of dinitro compounds applied before planting strawberries, grown as annuals in Louisiana, while not eliminating hand labour, reduced the amount required considerably.

2479. WILLIAMS, W. O.
Comparison of the effects of spray weed control, of summer covercrop and of clean tillage on the grape vine, its fruit, and on the soil.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 136-40, bibl. 8.

In trials over 4 years in California the effects of weed control with oil sprays, initially a special weed oil and latterly diesel oil fortified with pentachlorophenol, were compared with the normal practice of allowing weeds to grow after spring cultivation. In one trial control of weeds by spraying resulted temporarily in a marked increase in the growth of Tokay (*Vitis vinifera*) vines, a small increase of crop, a striking decrease in fruit colour and a marked decrease in the rate of water penetration into the soil, although the rate still remained high. In another trial with the variety Thompson Seedless, where spray control was compared with clean cultivation in the summer, there were no significant differences in growth, yield or fruit quality; however, the water penetration rate in this case was slightly higher in the sprayed areas, owing to the development of a pan in the cultivated plots.

Weed control in vegetables and potatoes.

2480. WARREN, G. F., AND OTHERS.
Control of weeds in vegetable crops and potatoes.
Res. Rep. 7th annu. N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 140-69.

The following notes are taken from a summary of 97 abstracts reporting weed control trials in vegetables: *Onions:* Crop injury has occurred on occasions from the pre-emergence use of 2,4-D at 1 lb. rate, with consistent safety reported at ½ lb. rate. Onions from sets were found more resistant to herbicidal treatments than those grown from seed. A number of promising new herbicides for pre-emergence application are listed. For the post-emergence treatment of onions NaCl, dinitros, PCP, KOCN and dilute sulphuric acid were found satisfactory on occasions. *Sweet corn:* The pre-emergence application of 2,4-D up to 2 lb. per acre and the dinitros and PCP continues to be quite effective. *Asparagus:* Good results followed pre-emergence treatment of 2,4-D; reports are conflicting with regard to dinitros and Na-PCP. *Carrots:* Pre-emergence weeding with TCA and NIX was promising, but not so with Varsol and 3,6-endoxohexahydrophthalate. *Other vegetables:* Trials in red beets, peas, beans, tomatoes, sweet potatoes, lettuce and other crops gave varied results. *Potatoes:* Pre-emergence applications of dinitros, pentachlorophenols and 2,4-D up to 2 lb. rates are reported to be satisfactory. In the post-emergence treatment of potatoes with 2,4-D, varietal differences appear to influence success.

2481. CHIPMAN, E. W.
Chemical weed control in vegetable crops.
88th A.R. N.Scotia Fruit Grs' Ass. 1951, pp. 73-7.

Recommendations are made for weed control with herbicides in asparagus, beets, carrots and parsnips, onions, corn, peas, beans and potatoes.

2482. BARRONS, K. C.
The relative tolerance of several vegetable crops to sodium TCA.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 54-5, bibl. 3.

The vegetables tested in greenhouse trials so far are classified as follows: *Susceptible* [to TCA]: sweet

corn and snapbean. *Intermediate:* spinach, muskmelon, cucumber, asparagus, pumpkin, okra, squash and onion. *Tolerant:* cabbage, kale, parsnip, Swiss chard, cauliflower, turnip, tomato, beet, broccoli, rutabaga, pepper, pea, radish, carrot, eggplant, celery and lettuce.

2483. GRIGSBY, B. H.
Post harvest control of weeds in asparagus.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., p. 58.
A spray mixture containing 75 lb. of dusting grade cyanamid, 1 lb. of wetting agent and 150 gal. of water per acre, gave 100% control of weeds in asparagus beds [in Michigan].

2484. HOLM, L. G.
Chemical weed control in red beets.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 55-6.
Pre-emergence application of 4 lb. per acre of sodium PCP or 10-12 lb. TCA is tentatively recommended for weed control in red beets.

2485. WARREN, G. F.
Crabgrass control in muskmelons and sweet potatoes.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., p. 59.
N-I-naphthyl phthalamic acid at 2 and 4 lb. and dichloral urea at 12 lb. per acre were the most promising materials used in trials [at Purdue University] for the control of crabgrass in muskmelons. Treatment with TCA delayed the maturation of the melons and maleic hydrazide caused almost complete crop failure. N-I-naphthyl phthalamic acid at 2 lb. also gave the best results in sweet potatoes. TCA, dichloral urea and maleic hydrazide reduced the yields of No. 1 tubers.

2486. ANDERSON, E. T.
Weed control studies with onions for Dutch sets.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 53-4.
Trials in Manitoba over a number of years have shown potassium cyanate, applied post-emergence, to be the most effective herbicide for onion beds. The correct rate of application appears to lie between 8 and 16 lb. per acre. With no treatment was any damage noted.

2487. NYLUND, R. E.
Weed control in potatoes with 2,4-D and MCP.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 57-8.
Both 2,4-D and MCP treatments, particularly the former, tended to reduce yields of U.S. No. 1 tubers [in Minnesota].

2488. WILSON, J. D., AND BRUNER, H. E.
Pre-emergence applications of contact and hormone herbicides to control weeds in potatoes.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., p. 57.
In Ohio, Cobbler potatoes were sprayed with 26 formulations of 12 different materials. Some of the best yields were obtained with Shell 130 plus endothal, sulfasan plus X B, Form A, sulfasan and Dow selective.

2489. LANA, E. P., AND STANIFORTH, D. W.
Herbicide studies with sweet corn.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 192-8, bibl. 10, being *J. Pap. Ia agric. Exp. Stat.* **J-1963.**
Three years' trials have shown that excellent weed control can be obtained without reduction in sweet corn yields from pre-emergence sprays of several 2,4-D formulations, sodium pentachlorophenate and Crag herbicide No. 1 (sodium 2,4-dichlorophenoxy ethyl sulphate). A slight reduction in plant stand and yield of crop occurred, however, one year when the 10 days before and the 10 days after treatment were unusually warm and dry. The results of post-emergence sprays of 2,4-D showed that the heavier rates of application tended to reduce yield and that some hybrids were more susceptible to injury than others.

2490. EMMERT, E. M., AND KLINKER, J. E.
The comparative use of aero cyanamid and allyl alcohol for controlling weeds in snap beans and sweet corn.
From abstr. in *Proc. Amer. Soc. hort. Sci.*, 1951, **58**: 191.*
Provided that temperatures exceeded 50° F. allyl alcohol at 2 ml. in 1 pt. water per sq. ft., applied 2 or 3 days before the crop was sown, gave highly significant reductions in weeds and was better than aero cyanamid which also gave significant reductions at 600 lb. per acre.

2491. LANA, E. P.
Commercial applications of herbicides to direct seeded tomatoes.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 59-60.
In Iowa, Stanisol (Stoddard Solvent) applied at 60 gal. per acre 4 days before emergence gave promising control of weeds in direct seeded tomatoes, the cost of the operation being considerably lower than that of mechanical weeding.

Weed control in tropical crops.

2492. BEST, J. C., AND GIBBENS, R. T., JR.
Commercial use of chemicals in sugar cane for the control of Johnson grass.
4th Proc. south. Weed Conf., Memphis, Tennessee, 1951, pp. 40-1.
It is shown that the pre-emergence use of 2,4-D greatly reduced weeding costs on 2 sugar cane plantations in Louisiana.

2493. STAMPER, E. R., AND CHILTON, S. J. P.
Effect of chemicals on Johnson grass rhizomes in sugarcane.
4th Proc. south. Weed Conf., Memphis, Tennessee, 1951, pp. 34-5.
Tabulated results presented indicate that 10 lb. or less per acre of TCA, and similar amounts of 2,4-D provide an efficient and cheap means of controlling Johnson grass infestations from rhizomes in sugar cane.

2494. CHILTON, S. J. P., AND STAMPER, E. R.
Field control of Johnson grass reinfestations from seedlings in sugarcane.
4th Proc. south. Weed Conf., Memphis, Tennessee, 1951, pp. 36-9.

* Published in full in *Progr. Rep. Ky agric. Exp. Stat.*, Dec. 1950.

TCA gave the best control of Johnson grass reinfestation, followed by 2,4-D plus flaming, while 2,4-D alone was the least satisfactory. Both yields of cane and sugar per acre were increased considerably by the control of Johnson grass.

2495. HAGOOD, E. S.
Studies on the control of large Johnson grass plants.
4th Proc. south. Weed Conf., Memphis, Tennessee, 1951, pp. 27-30.
Tabulated results are presented on the effect of herbicides on large Johnson grass plants growing on ditch banks, on their translocation, on the viability of eyes from treated and untreated rhizomes, and on the effect of herbicides on both weed and cane when applied to Johnson grass-infested cane stubble.

2496. STAMPER, E. R., COWART, L. E., AND RYKER, T. C.
Comparative efficiency of certain herbicides in 1950.
4th Proc. south. Weed Conf., Memphis, Tennessee, 1951, pp. 15-17.
Of the 5 chemicals tested as pre-emergence residual sprays for the control of Johnson grass in sugar cane, TCA applied at the rate of 4 lb. per acre and over, and ACP 646 (oil) at 2 lb. per acre were about equally effective, followed by a 2 to 4 lb. per acre application of amine 2,4-D. For post-emergence treatment 10, 20, and 30 lb. per acre of TCA and the same amounts of maleic hydrazide were very satisfactory.

2497. HARDCASTLE, W. S., AND STAMPER, E. R.
Effect of certain oils as herbicides for control of grass seedlings.
4th Proc. south. Weed Conf., Memphis, Tennessee, 1951, pp. 31-3.
Results obtained in field trials in Louisiana indicate that certain oils can be used for the control of Johnson grass seedlings in sugar cane if applied at the correct time as a directional spray. Pentachlorophenol and oil mixtures applied at rates which did not injure the cane were less effective than the oils.

Control of aquatics.

2498. MURDOCK, H. R.
Control of aquatic plants. Industrial wastes.
Industr. Engng Chem., 1952, **44**: 97A-99A, bibl. 5.
The action of certain herbicides on some of the more important aquatic weeds is discussed, but, in view of the difficulties encountered, it is suggested that "controlled pollution" of water ways by industrial wastes appears to be the best method for eradicating large areas of aquatic plants.

Control of woody plants.

2499. MELANDER, L. W., AND OTHERS.
Control of woody plants.
Res. Rep. 7th annu. N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 227-70.
Much valuable information is provided in the abstracts submitted. The chemicals most frequently used were 2,4-D and 2,4,5-T and their mixtures, and the trials show that some of their new formulations possess increased toxicity, reduced volatility and better solubility, in other words are more efficient. Other materials of importance for the control of woody plants are ammate, oil solutions, sodium chlorate and borax. The reactions of woody plants to formulations of various chemicals are tabulated.

2500. FISHER, C. E.
Woody plants. Summary of reporting research committee.
4th Proc. south. Weed Conf., Memphis, Tennessee, 1951, pp. 137-9.
The chief chemicals used for commercial control of woody plants are 2,4-D, 2,4,5-T, mixtures of the two, and ammate. They are applied to foliage, base of trunks or cut surface. Methods of treatment with reference to time of application, formulation and rate of the chemicals, and in some cases to plant species, are discussed.

2501. GRECO, E. C.
Control of marsh land brush with ammate.
4th Proc. south. Weed Conf., Memphis, Tennessee, 1951, pp. 97-101.
Experiments in Louisiana have shown ammate to be the most consistent and dependable killer of all woody mixed species of brush or marshland growth.

2502. EASTERBROOK, B.
Control of eucalypt seedlings and suckers.
Qd agric. J., 1951, **72**: 159-61.
Bulldozers were used successfully for clearing eucalyptus trees up to 5 in. in diameter and cables dragged between tractors were fairly successful in clearing seedlings and suckers. In trials with herbicides applied at 1% acid equivalent to stumps or frill cuts the sodium and triethanolamine salts of 2,4,5-T in water and the ester in power kerosene gave 85 to 90% kill. The esters of 2,4-D and 2,4,5-T combined in water gave poor results but in power kerosene gave 90% kill; kerosene alone gave 40% kill. Two wattles, *Acacia* spp., were also killed by spraying the lowest 2 ft. of the stem with 2,4,5-T without cutting the stems in any way, but this was ineffective with 4 *Eucalyptus* spp.

2503. NATION, H. A.
Palmetto can be controlled with chemicals.
4th Proc. south. Weed Conf., Memphis, Tennessee, 1951, pp. 94-6, bibl. 1.
A tentative recommendation is made for the control of palmetto, *Serenoa repens*, by 2,4,5-T alone and mixed with 2,4-D.

2504. GERTSCH, M. E., AND RYKER, T. C.
Chemical control of chickasaw rose [*Rosa bracteata*].
4th Proc. south. Weed Conf., Memphis, Tennessee, 1951, pp. 90-3.
In further trials in Louisiana [for earlier report see *H.A.*, 21: 509] 2,4-D was on the whole better than 2,4,5-T, and the isopropyl ester was the most effective 2,4-D formulation tested for the control of chickasaw rose.

Herbicides.

(*See also* 2751.)

2505. DUTTON, W. C., AND OTHERS.
New herbicides.
Res. Rep. 7th annu. N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 170-226.

One hundred and six abstracts are given describing trials on the use of 37 materials or groups of materials. The most widely tested new herbicide was maleic hydrazide, though at present it does not seem to fit well into any standard weed control programme. It depresses growth without killing the plants, and in general it does not exhibit marked selectivity. Reports are given of 26 trials with potassium cyanate and ethyl xanthogen disulphide, and of 22 with pentachlorophenol and disodium 3,6-endoxohexahydrophthalate. The crop plants in which the herbicides were tested included potatoes, onions, strawberries, gladioli, tomatoes, peas, beans and sweet corn.

2506. BOUILLENNE-WALRAND, M.
Hormones d'application. Recherches biologiques sur l'action des herbicides seléctifs 2-4 D et dérivés. **(The horticultural application of hormones. Biological investigations on the action of the selective herbicide 2,4-D and its derivatives.)**
C.R. Rech. I.R.S.I.A. No. 6: Trav. Centre Rech. Hormones veg. (1949-50), 1952, pp. 15-92, bibl. 35, illus.

In this series of 4 investigations, 2 are concerned with effect of herbicides on cereals and flax only. The other 2, abstracted here, deal also with weeds and horticultural plants. (1) In glasshouse trials the toxicity of 2,4-D acid and the sodium salts of 2,4-D, 2,5-D and 2,4,5-T was determined on oats and a number of broadleaf plants, including radish, chicory and several weed species, at different stages of development. Data are presented on the relative toxicity of the different herbicides. They showed least activity as pre-emergence sprays. In general the dicotyledonous plants were most vulnerable at the cotyledonary stage. Oats were particularly sensitive to 2,4,5-T at the seedling stage, a fact which suggests a possible means of controlling grass weeds. (2) Experiments were carried out on the residual activity of the sodium salt, ethyl ester and alkanolamine derivatives of 2,4-D applied to the soil before sowing. Of the 3 derivatives the alkanolamine retained its activity longest. The fruits of monocotyledons (oats, wheat) and the seeds of dicotyledons (fennel, plantain, radish and annual mercury), when sown immediately after application of the herbicides at the rate of 2 kg. per ha., were considerably inhibited in germination or retarded in growth. Radish was the most sensitive. Sown 30 days after application, the monocotyledons were unaffected but the growth of certain sensitive dicotyledons (radish and fennel) was retarded. The effect of the herbicides on spontaneous weed growth was also recorded.

2507. GERTSCH, M. E.
A comparison of oil, oil emulsions and water as carriers for 2,4-D.
4th Proc. south. Weed Conf., Memphis, Tennessee, 1951, pp. 18-22.

Black Valentine bush beans, which had their primary leaves expanded, were treated with 2,4-D and the growth above the second node was harvested after 9 to 11 days, the yields being used to determine the effect of various carriers. In an evaluation of water and 10% oil emulsion, made with the non-phytotoxic spray oil WS-1449, as carriers for the triethanolamine salt of 2,4-D, it was found that the effectiveness of 2,4-D was increased by the oil emulsion. The yields obtained indicated that considerably less vaporization of the isopropyl ester of 2,4-D occurred if the oil WS-1449 was used instead of water as the carrier. Reduction in yields demonstrated that more drift occurred when an oil carrier was used than with a 25% oil emulsion or water carriers. Rates of 2,4-D inversely affected yields.

2508. CARROLL, R. B.
Factors influencing the activation of 2,4-dichlorophenoxyethyl sulfate.
4th Proc. south. Weed Conf., Memphis, Tennessee, 1951, p. 13.

The selective herbicide 2,4-dichlorophenoxyethyl sulphate (E.H.1) is inactive when applied to plant foliage, but when it is applied to the surface of non-sterile soil, tomatoes, other sensitive plants, and germinating seedlings are affected within a few hours. The conversion of E.H.1 to an active compound is suspected of being due to hydrolysis, in the presence of either micro-organisms or acids, to 2,4-dichlorophenoxyethanol.

2509. LIHNELL, D., AND NORRBIN, J.
Skador av hormonderivat på kulturväxter. **(Hormone herbicide injury to cultivated plants.)**
Växtskyddsnotiser, 1951, No. 5-6, pp. 65-81, illus.

The herbicides used in these tests were, with few exceptions, of the 2,4-D and MCPA types. They were applied at different concentrations and the response of the treated plants was noted. Experimental material included tomato, potato, tobacco, melon, carrot, beetroot, *Pelargonium*, *Hibiscus*, apple and mulberry. Reactions to treatment are illustrated.

2510. BARRONS, K. C., AND HUMMER, R. W.
Some basic herbicidal studies with derivatives of TCA.
4th Proc. south. Weed Conf., Memphis, Tennessee, 1951, pp. 3-12, bibl. 12.

Absorption by underground parts was established as being the primary mode of entry of TCA for the plants tested. Leaching and decomposition both contributed towards the disappearance of TCA from soils. Analyses of soils and plants indicated that there is uptake of TCA by both tolerant and susceptible species which results in a lowered TCA content in the soil. A wide variation was found in the relative tolerance of crops. Cabbage and many other crucifers were tolerant of TCA, as were carrot, celery, parsnip, tomato, pepper, eggplant, tobacco and pea. The list of moderately tolerant plants includes several cucurbits, spinach, asparagus, potato, onion, sweet potato, strawberry and gladiolus. Beans, leguminous fodder crops and grasses were susceptible.

2511. Bucha, H. C., and Todd, C. W.
3-(*p*-chlorophenyl)-1,1-dimethylurea, a new herbicide.
Science, 1951, **114**: 493-4.
In greenhouse tests 3-(*p*-chlorophenyl)-1,1-dimethylurea at 0·1% and especially at 0·25% has proved very effective in killing seedlings of perennial and annual grasses.

2512. Jansson, S. L., Jacobson, G., and Jägerståhl, G.
Fält-och lysimeterundersökningar angående natriumklorat som ogräsbekämpningsmedel. **(Field and lysimeter trials with the herbicide sodium chlorate.)** [English summary 2 pp.]
Medd. Lantbruksh. Jordbruksf. **35**, 1951, pp. 109.
" It is possible to obtain a satisfactory reduction in the number of weeds by the use of chlorate, but . . . the chlorate remains in the soil and retains its poisonous effects for such a long time that there is always a danger of considerable damage to subsequent crops. The injurious after-effects vary according to several factors—type of soil, kind of crop, precipitation, etc.—but it has not been possible to find any conditions which would ensure good weed killing effects and at the same time an insignificant damage to subsequent crops. The results obtained from the tests with the leaching-out of sodium chlorate at the lysimeter installation . . . confirm the conclusions from the field experiments." The crops studied included potatoes and peas. A review of earlier physiological work on the action of the herbicide, carried out by Swedish workers, has been embodied in this bulletin.—Royal agric. Coll. and Nat. agric. Exp. Stat., Uppsala.

2513. Philipson, T.
The determination of chloride and chlorate in vegetative material and in soils.
Ann. roy. agric. Coll. Sweden, 1951, **18**: 74-85, bibl. 9.
This paper is the fourth of a series of Swedish publications dealing with the study of sodium chlorate as a herbicide.

2514. Ennis, W. B., Jr.
Effect of leaf surface upon the retention of herbicidal sprays.
4th Proc. south. Weed Conf., Memphis, Tennessee, 1951, p. 14.
Wholly aqueous droplets are repelled by the leaves of some species but retained by others. The use of light oils or of wetting agents improves leaf retention on plants which repel aqueous droplets. It is suggested that the natural waxes or bloom should be considered as another character to be looked for in the breeding programme, thus making crop plants more tolerant to certain herbicidal sprays, because of their poor wettability.

2515. Shanks, G. L.
Methods of determining the size and distribution of spray particles.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 82-4, bibl. 10.
Various methods in current use for determining particle size are reviewed, the lack of uniformity in droplet size given by modern spray nozzles is noted, the loss of spray material and drift hazard in concentrate spraying is stressed, and a simple method of determining relative particle size and distribution is described.

Noted.

2516.

a Brown, R., and others.
The stimulant involved in the germination of *Orobanche minor* Sm.
1. Assay technique and bulk preparation of the stimulant.
2. Chromatographic purification of crude concentrates.
Biochem. J., 1951, **48**: 559-64, bibl. 13 and 564-8, bibl. 11.

b Dickison, W.
Effect of herbicidal chemicals on equipment.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 21-2.

c Dutton, W. C.
Screening of new herbicides.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 119-21.
A critical review.

d Fisher, C. E.
Control of mesquite with growth regulator chemicals.
4th Proc. south. Weed Conf., Memphis, Tennessee, 1951, pp. 102-5.
With 2,4-D and 2,4,5-T.

e Fromm, F.
A quantitative evaluation of the Lemna test for herbicides.
Bot. Gaz., 1951, **113**: 86-90, bibl. 12.

f Fulton, E. F.
Weed control.
Fmg S. Afr., 1952, **27**: 33-6.
Includes a list of the 16 proclaimed weeds in Natal.

g Grigsby, B. H.
Control of crabgrass and other weeds in lawns.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 62-3.

h Loomis, W. E., and others.
Basic problems [in weed control].
Res. Rep. 7th annu. N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 276-81.
Ten abstracts on absorption, translocation and toxicity of herbicides.

i Norton, R. A., and others.
Mechanical considerations [in weed control].
Res. Rep. 7th annu. N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 271-5.

j Riepma, P.
De nawerking van het onkruidbestrijdingsmiddel 2,4-D in de grond. (Litteratuuroverzicht.) **(The residual effect of the herbicide 2,4-D in the soil. A review of the literature.)**
Landbouwk. Tijdschr., 1951, **63**: 347-50, bibl. 29.

k ROBERTS, R. H.
The use of fortified Stoddard to weed cranberries and carrots.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., p. 60.

l ROWE, V. K.
Health hazards associated with handling and use of herbicides.
Agric. Chemls, 1952, **7**: 2: 42-5, 110-13, bibl. 13.
The toxic hazards of 12 chemicals or groups of chemicals.

m TAYLOR, C. E.
Summary of 1950 research on weed control in vegetables and in potatoes.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 14-16.

n TULLIS, E. C.
Maleic hydrazide—a good grass controller.
4th Proc. south. Weed Conf., Memphis, Tennessee, 1951, p. 26.
Arrested growth without killing crabgrass, Bermuda *Panicum* spp., Barnyard and *Paspalum* species.

o WARREN, G. F.
New developments in chemical weed control: vegetables and sugar beets.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 63-4.

p WILSON, J. D., AND BRUNER, H. E.
Post-emergence control of weeds in snap beans using a shielded boom.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 58-9.

q WOLF, D. E., AND FLENNER, A. L.
Herbicidal formulations.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 22-4.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(*See also* 2033, 2034, 2036, 2042, 2070, 2217, 2388, Weeds and weed control section, 2682 i, 2835, 3183, 3184, 3188, 3199, 3205, 3217, 3231.)

2517. NILSSON, F.
Fröodlingsförsök med |köksväxter. **(Seed production experiments with vegetables.)** [English summary 2½ pp.]
Medd. Trädgårdsförs, Malmö **70**, 1951, pp. 35, bibl. 5.
The main results of vegetable seed production investigations carried out in Sweden, chiefly by the Ekerum Experimental Station, are: No significant differences were produced by plant thinning and treatment with nitrate of lime in cucumbers. Highest yields of brussels sprouts seed were obtained from plants overwintered in the field. With cabbage fertilizers had little effect, early drilling gave larger heads with greater yields, and autumn planting was superior to spring planting. With onion, parsnip, parsley and red beet, only parsnip responded markedly to the application of nitrate and red beet to potash and phosphate. Parsley grew more vigorously when planted alone than when intercropped with cereals. With beetroot spacing of 20 cm. in the rows was preferable to 30 cm.; there were no differences in seed yield between rows 85 and 60 cm. apart.

2518. PHILIPP, F.
Die österreichischen Gemüsebauversuchsanlagen und ihr Arbeitsgebiet. **(The Austrian vegetable experiment establishments and their field of operation.)** [English and French summaries 5 lines each.]
Mitt. Klosterneuburg, 1952, **2**: 15-16.
A note on the experimental programmes of the Neusiedl am See and Zinsenhof Stations.

2519. VAN KOOT, Y., AND DE ZEEUW, A.
De goenteteelt in het bijzonder onder glas in West-Duitsland. **(Market gardening in Western Germany, especially cultivation under glass.)** [English summary ⅔ p.]
Meded. Dir. Tuinbouw., 1951, **14**: 845-60, illus.
During a study-tour in Western Germany in August 1950, the authors observed (among other activities) the following: Market gardens producing out-door crops predominate, but particular mention is made of a glasshouse flower farm at Sinaii near Frankfort and a nursery for vegetables at Wiesmoor. Among problems being studied at the University at Bonn are fusarium wilt of cucumbers and sprinkler irrigation of horticultural crops. Research work at the Horticultural University College at Hannover includes periodicity in germination of seeds, and the construction of soil block makers. Both at the Central Institute for Plant Protection at Brunswick and at the biological laboratory of the Bayer firm at Leverkusen crop protection products are being tested.

2520. VARMA, S. R.
Further trials on the production of the European type of biennial vegetable seeds from 1949 to 1951.
Indian J. hort., 1951, **8**: 3: 9-11.
It is concluded from 4 years' experience in India that seed-to-seed production of European vegetables in the hills above 5,000 ft. is feasible. Seed cannot be produced on the plains and though mature plants can be transferred from the plains to the hills the method is uneconomical [see *H.A.*, 21: 3565.]

2521. FLORENCE, A.
Graines maraichères, leur longévité et leur germination. **(The longevity and germination of vegetable seeds.)**
Rev. hort. Algér., 1951, **55**: 117-19.

This brief review of the factors associated with the longevity and germination of seeds includes a tabulated list of 39 kinds of vegetable showing how long the seeds can be kept, and the time they take to germinate.

2522. GEHBAUER, F.
Die Chemie als Helfer in der Pflanzenzüchtung. **(Chemistry as an aid to plant breeding.)** [English and French summaries 4 and 5 lines.]
Mitt. Klosterneuburg, 1952, **2**: 6-8, bibl. 2.
Experiments at Schönbrunn showed that spraying potatoes, sweet potatoes, tomatoes and paprikas with dilute solutions of acetic acid, butyric acid, boracic acid or potassium permanganate prevented premature blossom- and fruit-fall.

2523. CHARAVANAPAVAN, C.
The vitamin "A" contents of Ceylon leafy vegetables.
Trop. Agriculturist, 1951, **107**: 23-4.
The results of analyses for vitamin A of 25 local leafy vegetables are tabulated and in some cases compared with figures, sometimes very different, recorded in other countries.

2524. GELIN, O. E. V.
Electric illumination of greenhouse cultures. [Summaries in German and Swedish.]
Agri hort. Genet., 1951, **9**: 88-96, bibl. 4, illus.
In earlier trials at Weibullsholm, Sweden, the experimental plants, including lettuce and peas, utilized the illumination supplied by both blended light and fluorescent lamps extremely well. In the winter of 1948-49 lettuce and stocks were used as test plants and fluorescent lamps were found to provide the better light. Fixed and automatically moving tubes were compared, and while the light provided by the fixed fluorescent lamps was more favourable to plant growth, the moving light also gave very good results, and shows promise, especially for larger concerns. Good illustrations are given of the moveable equipment. During experiments in a garden at Kristianstad illuminated begonia stock plants grew faster and gave considerably higher yields of leaves than those grown without illumination. Of the light sources used, mercury lamps (HO 2,000) were somewhat better than fluorescent tubes.

2525. V.D. BERG, C.
The influence of salt in the soil on the yield of agricultural crops.
Trans. 4th int. Congr. Soil Sci., Amsterdam 1950, Vol. I, pp. 411-13 [received 1952].
The amount of salt in the soil which would not reduce yields below 75% of normal was ascertained for a number of crops including potatoes, onions, beans, poppies and peas on land in S.W. Holland, which had been inundated in 1944-45.

2526. BEAR, F. E.
Some soil organic matter relationships.
Trans. 4th int. Congr. Soil Sci., Amsterdam, 1950, Vol. I, pp. 114-25 [received 1952].
Details of a comprehensive 8-year experiment on two coastal-plain soils in New Jersey cropped with snap beans and carrots are given. The increases in yield and soil humus obtained by the addition of various types of organic matter are enumerated. Rye and the natural growth of weeds were found the most satisfactory for a one-year fallowing programme, and in a 2 out of 4 year following programme, harvesting the cover crop was found preferable to leaving it on the land. The effect of organic matter additions on the cation exchange capacity of the soil and the Ca, K, Mn and B contents is noted.

2527. WARE, L. M., AND JOHNSON, W. A.
Value of irrigation with different fertility treatments for vegetable crops.
Bull. Ala. agric. Exp. Stat. **276**, 1950, pp. 69, from abstr. in *Soils and Ferts*, 1952, **15**: 642.
Yield increases were higher from the use of irrigation and organic materials used in combination than from their use separately, except for summer crops. Yields continued to increase as fertilizer rates were increased, organic materials added and irrigation applied. Limits were approached with 1,000 lb./acre of 6:10:4 fertilizer, 10 tons of stable manure, a crop of vetch and 1 in. of water per week.

2528. TROCMÉ, S., BARBIER, G., AND CHABANNES, J.
Recherches sur la chlorose, par carence de manganèse, des cultures irriguées à l'eau d'égout. **(Research on chlorosis caused by manganese deficiency in crops irrigated by sewage water.)**
Ann. agron. Sér. A, 1950, **1**: 663-85, bibl. 23.
This is an enquiry into the chlorosis in market garden crops grown on land irrigated by the Paris sewage water which is partially purified by filtration through alluvial sandy soils along the river banks below the city. These soils are very porous and allow of active biological oxidation of the organic materials in the sewage water. The crops grown there did well for a time, but in recent years have shown chlorotic foliage and given low yields. Observations have shown that the oxidized forms of manganese are reduced, even in a well aerated environment, by the fermentation of organic materials which thus become more soluble. On the other hand the reduced forms of manganese present are subject to oxidation by certain organisms. The net result is that those soils become very unfavourable for retaining the different forms of Mn and the Mn deficiency is serious enough to cause chlorosis and much diminished yields.

2529. SILBERSTEIN, O., AND WITTWER, S. H.
Foliar application of phosphatic nutrients to vegetable crops.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 179-90, bibl. 11, illus., being *J. Art. Mich. agric. Exp. Stat.* **1220.**
Twelve organic and inorganic phosphorus compounds, applied in greenhouse and field tests to the leaves of tomato, bean, and maize plants growing at low P levels, gave definite growth responses as indicated by height and fresh weight measurements. Early yields, but not total yields, of field tomatoes were increased significantly by 4 weekly foliar sprays of a 25 millimolar solution of ortho-phosphoric acid, which was generally the most effective of the chemicals used. Considering the quantities used, foliar-applied P was used much

more efficiently than P applied broadcast to the soil, but the latter gave the highest total yield. Tracer studies showed that radioactive *o*-phosphoric acid was rapidly absorbed by the leaves and translocated to the root tips and other centres of high metabolic activity.

2530. NAUNDORF, G.
Compuestos orgánicos del fósforo como fertilizantes en forma de pulverizaciones sobre las hojas de la planta. I[a] nota: Glicerofosfato de calcio. **(Organic phosphorus compounds as fertilizers applied as foliage sprays. I. Calcium glycerophosphate.)** [English summary 3 lines.]
Not. agron. Palmira, 1951, **4**: 49-51, illus.

Cos lettuce and tomato plants were grown in sand culture and watered with (*a*) distilled water, (*b*) complete Knop's solution, or (*c*) Knop's solution lacking phosphorus. Some of the plants given treatment (*c*) were sprayed with solutions of calcium glycerophosphate at concentrations of 1 g., 2·5 g., 5 g. and 10 g. per litre of water. Plants given the foliage sprays, especially at the 3 higher concentrations, developed better than those grown in Knop's solution lacking phosphorus and as well as those grown in complete Knop's solution.—Palmira agric. Exp. Stat.

2531. HAAGEN-SMIT, A. J., AND OTHERS.
Investigation on injury to plants from air pollution in the Los Angeles area.
Plant Physiol., 1952, **27**: 18-34, bibl. 12, illus.

A joint research programme was carried out by the Los Angeles County Air Pollution Control District, the California Institute of Technology, and the University of California to determine the nature of the air impurities responsible for crop damage in the Los Angeles area. Spinach, sugar beet, endive, oats and alfalfa were used as test plants. The production of a metallic glaze or silvering on the lower surface of leaves of spinach, beet and endive distinguishes this air pollution, or smog damage, from the effect of previously known toxic materials. It was found that the reaction products of ozone with unsaturated hydrocarbons produced typical smog damage on all the indicator plants. The damaging factor is therefore attributed to the peroxide formed in the ozonization process. The catalytic oxidation of olefins with NO_2 under the influence of sunlight produced oxidation products very similar to those produced by ozone. These investigations demonstrate the value of plants for analysing air pollutants. They further show for the first time that hydrocarbons, normally harmless air pollutants, may cause severe damage through their reaction with substances known to be in the air.

2532. HEINZÈ, K.
Virusübertragungsversuche mit Blattläusen auf Dahlien, Gurken, Zwiebeln, Wasserrüben und einigen anderen Pflanzen. **(Virus transmissions with aphides to dahlias, cucumbers, onions, turnips and some other plants.)** [English summary ½ p.]
Z. PflKrankh., 1952, **59**: 3-13, bibl. 11, illus.

Aphid vectors can be classified as occasional vectors, which have no close connection with the host plant, and normal vectors which regularly colonize the host plants of the viruses. A list is given of some new vectors of dahlia mosaic, cucumber mosaic, onion yellow dwarf, turnip mosaic, leaf roll of potato, yellow bean mosaic, mosaic of annual stock, poppy mosaic and net mosaic on delphinium.

2533. CROSIER, W. F.
Report of the Committee on the determination of seed-borne diseases.
Proc. int. Seed Testing Ass., 1951, **16**: 291-9.

The recommendations made on examining seeds for the presence of pests and diseases extend to the following, among other crops: Bean, broad bean, cabbage and other crucifers, carnation and other cariophyllaceae, carrot, celery, China aster, parsley, pea, pepper and tomato.

2534. MURBACH, R., KELLER, C., AND BOURQUI, P.
Échec au ver blanc. **(Controlling cockchafer larvae.)**
Rev. romande Agric. Vitic., 1952, **8**: 19-21, illus.

On the basis of preliminary large-scale trials carried out in Switzerland in 1951, recommendations are made for the control of cockchafer larvae by cultural methods.

2535. ENTOMOLOGICAL BRANCH, DEPARTMENT OF AGRICULTURE, N.S.W.
Soldier beetles (*Telephorus pulchellus*).
Agric. Gaz. N.S.W., 1952, **63**: 40, illus.

In some seasons these beetles appear in vast numbers and may cause considerable concern to gardeners and others who find their vegetables and shrubs covered with closely packed masses. They are not known, however, to cause any appreciable injury to plants, beyond weighing them down. The beetle has been known to feed upon the caterpillars of the codling moth. It has a wide distribution in Australia. Should control measures be considered necessary, a 0·1% DDT emulsion spray would probably prove effective.

2536. WILSON, J. D.
Low gallonage fungicide sprays [on vegetables].
Agric. Chemls, 1952, **7**: 2: 40-1.

The biggest problem in the use of low gallonage sprays is that of getting equipment which will ensure a maximum degree of thoroughness in the distribution of spray material. At Wooster, Ohio, 4 times the normal concentrations of several fungicides applied at 40 gal. per acre gave as good control of early and late tomato blight as did the usual treatments. A number of fungicides have been used with little positive evidence of an increase in phytotoxicity with an increase in concentration. In a few borderline cases, such as the use of some of the fixed coppers on cucurbits and beans, the injury sometimes caused at regular dilutions and volumes of application was increased when a 4× concentration was applied at 40 gal. per acre.

2537. JACKS, H., AND WEBB, A. J.
Damage to vegetable seedlings and plants by application of HETP (Hexone).
Orchard. N.Z., 1951, **24**: 6: 21-3.

Control of green vegetable bug can be obtained by application of HETP, and trials were carried out to determine whether vegetables were likely to be damaged by this material. HETP was safe at concentrations (in pints to 100 gal.) (*a*) up to 4 on cucumber; (*b*) up to 1½ on French bean, broccoli, onion, parsley, pumpkin, rhubarb and swede; (*c*) up to 1 on broad bean, runner bean, beetroot, brussels sprouts, cabbage, cauliflower, celery, eggplant, maize, parsnip, potato, silver beet, spinach and turnip; and (*d*) up to ¾ on carrot, kale, lettuce and radish. Severe damage resulted from all concentrations of HETP applied to tomatoes. Peas were also damaged at all concentrations, the effect increasing with concentration.

2538. (Friend, A. H.)
"Preparation 8169"—promising new systemic insecticide.
Agric. Gaz. N.S.W., 1952, **63**: 89.
A new systemic insecticide, Systox or Preparation 8169, has shown considerable effectiveness against aphids in preliminary experiments conducted by the Entomological Branch of the N.S.W. Department of Agriculture. The tender young foliage of tomatoes, beans and peaches was not injured by concentrations of 0·1% actual insecticide. Very light "top-sprays" containing as little as 0·025% have shown their systemic effect upon the grey aphid, colonies of which, protected by the curled leaves of cauliflowers, were mostly killed, and completely eradicated at higher concentrations, within 4 days. Irrigating soil with water containing up to 0·2% did not injure potted cabbage or tomato plants, while dosages of ½ pt. of 0·05% actual insecticide gave complete kills within 3 days of grey aphids on the leaves of large cabbages growing in 4 gal. tins of soil.

Artichokes.

(*See also* 2682g.)

2539. Diehl, R., Dupuis, G., and Tsvetoukhine, V.
Recherches sur le topinambour. **(A study of the Jerusalem artichoke.)**
Ann. Amél. Plantes, 1951, **1**: 336-54, bibl. 6, illus.
During the last war the Jerusalem artichoke was grown in Brittany as a fodder crop and as a source of industrial alcohol. Different types and varieties were studied and analytical data are presented on their composition. The figures show that the dry matter, sugar and protein content of the improved varieties per hectare is higher than that of potatoes and semi-sweet beets and that their alcohol yield is comparable to that of sugar beet.—École Nationale d'Agriculture, Rennes.

2540. Gigante, R.
Il mosaico del carciofo. **(Artichoke mosaic.)**
Boll. Staz. Pat. veg. Roma, 1949 (issued 1951), **7**: 177-9, bibl. 1, illus.
A mosaic disease of globe artichoke (*Cynara scolymus*), found on leaves from Sicily, is described. Successful inoculations of healthy artichoke leaves and leaves of cardoon (*Cynara cardunculus* var. *utilis*) suggest that it is a virus disease.

Asparagus.

(*See also* 2682i.)

2541. Graham, K. M.
A fusarial disease of seedling asparagus in Ontario.
From abstr. in *Phytopathology*, 1952, **42**: 9.
The symptoms were stunting, yellowing, wilting, and pre-emergence blight. The fungus was identified as a strain of *Fusarium oxysporum*. The introduction into the seed bed of a soil disinfectant, Arasan (3 g. per sq. ft.), significantly controlled the amount of pre- and post-emergence damping-off.

2542. Kahn, R. P., Anderson, H. W., and Hepler, P. R.
Asparagus rust investigations in Illinois.
From abstr. in *Phytopathology*, 1952, **42**: 13.
The so-called rust-resistant Washington varieties of asparagus were shown to be extremely susceptible to *Puccinia asparagi* in the greenhouse and field and may no longer be considered as commercially rust-resistant under Illinois conditions.

2543. Crittenden, H. W.
Resistance of asparagus to *Meloidogyne incognita* var. *acrita*.
From abstr. in *Phytopathology*, 1952, **42**: 6.
In a field heavily infested with this nematode asparagus roots showed no hypertrophy; the average occurrence of females with egg sacs was one per plant. Cantaloupes adjacent to the asparagus were heavily knotted. These observations indicate that asparagus would be a suitable crop for land infested with the nematode.

2544. Delplace, E., and Desbois, A.
Nouveau procédé de lutte chimique contre la mouche de l'asperge ou mouche d'Argenteuil. **(A new method of chemical control for the asparagus fly.)**
Rev. hort. Paris, 1952, **124**: 658-9, illus.
The asparagus fly (*Platyparea poeciloptera*) is a serious pest in all the asparagus growing districts of France, and notably in the valleys of the Seine, Loire and Rhône. No attempt at control has so far been successful. Observations on the biology of the fly are reported, and an account is given of control trials with S.P.C. (polychlorocyclane sulphate) carried out in several commercial fields in Loir-et-Cher. The results were highly satisfactory and led to the following recommendations: 2 applications of Braconyl 25 (containing 25% technical S.P.C.), at the rate of 12-15 kg. per ha., should be given with a 10-15 day interval, the first application being made when the spears emerge after the first appearance of the flies. A third application may be necessary in seasons when oviposition is prolonged. Treatment did not appear to affect the flavour of the spears.

Brassicas.

(*See also* 2682a, v, z.)

2545. Ministry of Agriculture, London.
Cauliflowers.*
Bull. Minist. Agric. Lond. **131,** 3rd edition 1951, pp. 20, illus., 1s. 9d.

* For notes on earlier editions see *H.A.*, 16: 209 and 18: 2688.

The changes that have been made in this third edition include slight revision of the list of varieties, more detailed information on the sowing of summer cauliflowers, the addition of a note on plant-raising methods used in the Evesham district, and a photograph illustrating the method of filling pots set in frames with soil.

2546. AXELSSON, F.
Comet Weibulls/51 eine neue Blumenkohlsorte für das Treibhaus. (Comet Weibulls/51, a new glasshouse cauliflower variety.)
[English and Swedish summaries ½ p. each.]
Agri hort. Genet., 1951, **9**: 139-53, illus.

An account is given of the breeding work and trials in Sweden with the new very early cauliflower variety, Comet W:s/51. The plant is of slow growth but develops evenly, thus the whole crop can be harvested almost simultaneously. The heads are smaller than those of the later varieties, and an extraordinarily high percentage of them are of first class quality.

2547. TANDON, S. L.
Colchicine-induced polyploidy in *Brassica oleracea* var. *botrytis* L.
Sci. and Cult., 1951, **16**: 483-4, bibl. 4.

Application for 24 hours of 0·10 and 0·20% aqueous colchicine to the growing point of 20-day old cauliflower seedlings induced polyploidy.—St. Coll. Washington, Pullman.

2548. NORTH, C.
Vegetative propagation of cabbage and allied vegetables.
Emp. J. exp. Agric., 1952, **20**: 43-6, bibl. 6, illus.

Three methods of vegetative propagation have been used at the National Institute of Agricultural Botany, Cambridge, to reproduce improved strains of *Brassica oleracea*. 1. Brussels sprouts were maintained in the vegetative phase by transferring plants from the field to a greenhouse in October and keeping them at a temperature above 60° F. During the winter the "buttons" were cut off to leave stumps ¼"-½" long. Shoots growing from buds on these stumps may be struck as cuttings, but a more rapid rate of multiplication—up to 277 clones from one plant—was to use leaf-bud cuttings taken when the lamina was 1"-2" long. A similar method has given promising results with cabbage. 2. Good results have been obtained with brussels sprouts and marrow-stem kale by planting sections of root upright in sterilized sand, keeping them at 60°-70° F., and after 6-8 weeks removing and striking the adventitious shoots. 3. Sections of broccoli curd each with a portion of leaf attached were treated with hormone, set in pots and kept at 60° F. Within 2 months adventitious buds arose from the base and were used as cuttings. As many as 40 clones have been derived from one curd, the great majority developing into plants in a vegetative condition.

2549. ZINK, F. W., AND AKANA, D. A.
The effect of spacing on the growth of sprouting broccoli.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 160-4, bibl. 2, and *Truck Crops Mimeo Univ. Calif.* **50**, pp. 9.

In 2 trials in California sprouting broccoli was sown in 2 rows 13 in. apart on beds 40 or 42 in. wide. In one trial the plants were thinned to 4, 6, 8 or 12 in, in the row and in the other to 8, 12, 16 or 20 in. with the plants in the 2 rows staggered. Early and later maturing strains were involved. At spacings below 8 in. many stalks failed to reach an adequate size, and for quick maturing strains even 8 in. was rather too close. One of just over 8 in. in the rows is recommended. Thinning to 12 in. spacing generally gave significantly lower yields than 8 in. A hollow stem condition appeared to be related to the more rapid growth occurring at the wider spacings.

2550. RYALL, P. L. J.
Green crop water requirements for optimum growth.
[*Publ.*] *Brit. Soc. Res. agric. Engng.* **C.S.16**, 1952, pp. 12, bibl. 1, maps, 3s.

The potential transpiration of green crops from April to September has been calculated from an extensive network of stations in England and Wales, and is compared with the rainfall obtained during the same period. From these data a series of maps showing the probable irrigation requirements have been produced. The maps show that all England east of a line from Grimsby to Bournemouth needs irrigation at least 2 years in 3. Most of this area, including all the chief growing districts, need it 4 years in 5, while much of Suffolk, Essex, Kent and Sussex requires irrigation 9 years in 10. All market gardening areas in England and the leading ones in Scotland would benefit from irrigation 2 or more years in 5. At least 2 in. of irrigation water are required over S.E. England in an average year. As many as 5 in. are required round the Thames Estuary. In drought years irrigation requirements range from 4 in. in the market-gardening areas of Scotland to 10 in. round the Thames Estuary.

2551. PLANT, W.
The relation of molybdenum deficiency to the acid soil complex.
Trans. 4th int. Congr. Soil Sci., Amsterdam 1950, Vol. II, pp. 148-51 [received 1952].

Whiptail (molybdenum deficiency) of cauliflowers and broccoli, confined to acid soils in England, was corrected by sodium molybdate at 2 lb. per acre or by $CaCO_3$ at rates which raised the pH above 6·0. It is suggested that the effect of lime is to make molybdenum, presumably fixed by an acid soil reaction, available in the soil solution [see also *H.A.*, 21: 2600]. The occurrence of manganese toxicity with molybdenum deficiency has been noted in trials with marrow-stem kale.

2552. MAIER, W.
Bormangelkrankheiten an Blumenkohl (*Brassica oleracea* L. var. *botrytis* L.) und Kohlrabi (*Brassica oleracea* L. var. *gongylodes* L.). **(Boron deficiency diseases in cauliflower and kohlrabi.)**
Angew. Bot., 1951, **26**: 3-12, bibl. 9, illus.

This is the first record of naturally occurring boron deficiency symptoms in cauliflower and kohlrabi in Germany. In affected cauliflowers glassy and brown spots, which developed into cavities, appeared in the pith of the stem and in the head. In more severe cases individual flower primordia or whole inflorescences turned brown and died. An application of

4 mg. borax per m² proved sufficient to raise the boron content of the leaf from 65 to 105 mg. H_3BO_3/kg. dry matter and that of the head from 42 to 75 mg., and thus to overcome the trouble. The symptoms of boron deficient kohlrabi plants are also described and illustrated.—Hort. Res. Stat., Geisenheim/Rhein.

2553. Pound, G. S.
Relation of air temperature and virus concentration to mosaic resistance in cabbage.
Phytopathology, 1952, **42**: 83-8, bibl. 9, illus.
Progenics of cabbage highly resistant to mosaic disease have expressed this resistance under artificial inoculation only at 24° C. or below. At 28° C. infected plants develop severe symptoms. At 16° and 20° C., where resistance was very high, the virus was present in very low concentrations; at 28° C., where symptoms were very severe, the virus concentrations were very high.—University of Wisconsin.

2554. Chattopadhyaya, S. B.
Control of post-emergence damping off of vegetable seedlings.
Sci. and Cult., 1951, **17**: 37-8, bibl. 9.
In a small scale trial mercuric chloride, 1 part to 1,500 parts water, applied to the soil at the onset of damping off caused by artificial inoculations of *Pythium aphanidermatum*, gave as good control as soil sterilization with cauliflower, cabbage and tomato.

2555. Sellke, K.
Hexa- oder E-Mittel zur Bekämpfung von Wurzel- und Stengelschädlingen am Blumenkohl. **(BHC or phosphoric acid ester preparations for the control of pests attacking the roots and stems of cauliflower?)**
NachrBl. dtsch. PflSchDienst, Berlin, 1951, **5**: 141-5, bibl. 4, illus.
Trials in Eastern Germany showed BHC preparations to give better control of cabbage root fly [*Chortophila brassica*], cabbage stem weevil, *Ceuthorrhynchus quadridens* and turnip gall weevil, *C. pleurostigma*, than did phosphoric ester preparations. Damage by wireworms and centipedes was also reduced by BHC treatment. A single application of either spray or dust sufficed.

2556. Schmidt, M., and Goltz, H.
Die einfachste Bekämpfungsmethode gegen Kohlfliege und Kohlgallenrüssler. Versuche mit Hexa- und E-Stäubemitteln. **(The simplest method of controlling cabbage root fly and turnip gall weevil. Trials with BHC and E-605 dusts.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1951, **5**: 201-3, bibl. 5.
A simplified method of controlling cabbage root fly (*Chortophila brassicae*) and turnip gall weevil (*Ceuthorrhynchus pleurostigma*) in cabbage was shown to be effective in one year's trials. Instead of watering the plants with the insecticide or mixing the dust with the soil from which the pots are made, dusting the surface of the soil pot with a BHC preparation, shortly before planting out or before the sale of the plants, was found to afford excellent protection. Application of the dust to the soil in the field immediately before planting out gave equally satisfactory results. In that case the dosage applied to each future planting spot was 1 g. (Arbitex), as compared with 0·2 g. per soil pot. Surface dusting of the soil with BHC was reported by Sellke [see 2555] to be effective also against the cabbage stem weevil (*Ceuthorrhynchus quadridens*). E-605 failed to reduce cabbage root fly and turnip gall weevil infestation.

2557. Nolte, H.-W.
Blumenkohlschädigung durch E-Präparate beim Erdtopf-Kohlfliegenbekämpfungsverfahren. **(Damage to cauliflowers by phosphoric acid ester preparations used for cabbage root fly control.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1951, **5**: 183-5, bibl. 3, illus.
Applications of E605 and Wofatox dusts at the rate of 5-10 kg. per cu.m. of soil were found to be toxic to cauliflower transplants, reducing ultimate yields, but the 1-2 kg. per cu.m. treatment recommended previously [see *H.A.*, 21: 1628] is considered safe.

2558. Carlson, E. C., Lange, W. H., Jr., and Sciaroni, R. H.
Distribution and control of the cabbage seedpod weevil in California.
J. econ. Ent., 1951, **44**: 958-66, bibl. 10, illus.
Commercial control of the cabbage seedpod weevil, *Ceuthorrhynchus assimilis*, with technical BHC was satisfactory, but lindane is considered a more desirable and safer material to use.

2559. Reid, W. J., Jr., and Cuthbert, F. P., Jr.
Value of auxiliary materials in rotenone and pyrethrum insecticides for control of cabbage caterpillars.
[*Publ.*] *U.S. Dep. Agric.* **E-834**, 1952, pp. 24, bibl. 6.
The pests included in these trials were the cabbage looper (*Trichoplusia ni*), the imported cabbage worm (*Pieris rapae*), the diamond back moth (*Plutella maculipennis*), the corn earworm (*Heliothis armigera*), the fall armyworm (*Laphygma frugiperda*), and several species of climbing cutworms, including the granulated cutworm (*Feltia subterranea*). In general, insecticides containing pyrethrum proved more effective against the cabbage looper than those containing rotenone. The reverse was true of the imported cabbageworm and the diamond back moth. Neither of these insecticides gave satisfactory control of the Agrotinae. Auxiliary materials that proved of significant value were mineral oil, mineral oil and sulphur, piperonyl cyclonene, and an organic thiocyanate. A combination of 2% of mineral oil and 10% of dusting sulphur gave the highest increases in caterpillar control. The auxiliary materials were usually of most value with pyrethrum used against the imported cabbageworm and diamond back moth and with rotenone against the cabbage looper. Impregnated pyrethrum dusts usually proved more effective against the caterpillars than ordinary dust mixtures of the same pyrethrins content, but they were more difficult to blend and apply.

2560. Stoner, W. N.
A 2,4-D chemical causes unusual injury to cabbage.
Plant Dis. Reptr, 1951, **35**: 327-8, illus.
The older plants showing this disorder had developed rather large tumours at the abscission layer of the

foliage leaves; where leaves did not absciss no galls were noted. The younger plants were affected in the same way except that the galls were smaller; instead of producing heads these plants continued to elongate and eventually leaf malformation and twisting occurred. A few days before the condition was first reported a main drainage canal had been sprayed with a 2,4-D alkanol amine salt for the control of water hyacinth. The damage to the cabbage plantings is believed to be directly traceable to this spraying operation.

Carrots.

(*See also* 2112, 2682a, 2722.)

2561. HARRINGTON, J. F.
Effect of spacing and size of root on carrot seed yield and germination.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 165-7, bibl. 6.

Large, medium, and small sized carrot roots were spaced 30, 15 and 10 inches apart in rows 30 inches apart. Red Cored Chantenay and Imperator varieties were used. For both varieties, large roots gave the highest yields regardless of spacing. Fifteen inch spacing yielded as well as 10 inch spacing. Both spacings gave significantly higher yields than the 30 inch spacing. The percentage germination showed no significant differences among either size of root or spacing treatments. [Author's summary.]—Univ. Calif., Davis.

2562. POST, J. J.
Het verband tussen het weer en de oprengst van tuinbouwzaden: wortelzaad (Amsterdamse Bak). **(The correlation of weather conditions and yields of horticultural seeds: carrot seed, variety Amsterdam Forcing.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1952, **15**: 218-22.

An investigation on the relation between weather conditions and yield of carrot seed gave the following results: (1) A fairly reliable positive correlation between yield and the number of days with rainfalls of 0·1 mm. or 1·0 mm. and over respectively in the month of March. (2) A fairly reliable negative correlation under the same weather conditions in April. (3) A reliable negative correlation under the same weather conditions in June. (4) A fairly reliable positive correlation with the temperature during the 3rd decade of April and the 1st decade of May, and during the 1st and 2nd decades of June, and fairly reliable negative correlations with the temperature in the 2nd decade of March and the 3rd decade of August. (5) There was no reliable correlation with sunshine or cloudiness. The correlations with rainy days in June are of some significance for drafting crop estimates.

Celery and celeriac.

2563. SWANK, G., JR.
A preliminary report of a new compound, trans 1, 4-dibromobutene-2, for the control of damp-off.
Plant Dis. Reptr, 1951, **35**: 492-3, bibl. 1, illus.
MILLER, P. R.
Fungicides effective on vegetable crops.
Agric. Chemls, 1952, **7**: 3: 67-9, illus.

Results obtained with the use of various chemicals on celery seed-beds indicate that trans 1, 4-dibromobutene-2 and methyl bromide were significantly better than the other treatments for the control of the damping-off organism. Species of three genera of fungi—*Rhizoctonia*, *Pythium*, and *Fusarium*—have been isolated from diseased root tips; these fungi have been tested and their pathogenicity confirmed.—Central Florida Exp. Stat., Sanford, Florida.

2564. SCHÜTZ, F., AND KUNDERT, J.
Versuche zur Bekämpfung der Blattfleckenkrankeit an Sellerie in Verbindung mit Düngungsversuchen. **(Experiments on the control of leaf-spot of celeriac in conjunction with fertilizer trials.)**
Reprinted from *Gemüsebau*, 1951, pp. 31, bibl. 6, illus.

In trials at Wädenswil copper containing spray materials gave very good control of leaf-spot, *Septoria apii*, infecting celeriac, while copper-free sprays were practically ineffective. Limited experiments with dusts gave similar results. Contrary to earlier belief increased fertilizer applications were not found to be a substitute for spraying, and both adequate fertilizing and direct control measures against leaf-spot are considered to be necessary and complementary cultural operations.

2565. LOWNSBERY, B. F., AND LOWNSBERY, J. W.
***Paratylenchus hamatus* Thorne and Allen associated with celery disease in Connecticut.**
From abstr. in *Phytopathology*, 1952, 42: 13.

Fields of stunted and chlorotic celery were found to be infested with 1,000 to 8,000 *Paratylenchus hamatus* per 250 c.c. of soil, the larvae and adults feeding on the roots. This nematode has been previously reported only on fig in California. The addition of 2,500 of the nematodes to potted celery plants growing in soil previously treated with methyl bromide resulted in significant reduction in weights of these plants compared with non-infested, methyl bromide-treated checks.

Cucurbits.

(*See also* 2532, 2682s.)

2566. NITSCH, J. P., AND OTHERS.
The development of sex expression in cucurbit flowers.
Amer. J. Bot., 1952, **39**: 32-43, bibl. 38, illus.

In the axil of each leaf of the Acorn squash (*Cucurbita pepo* L.) a flower bud is present, but the type of flower which develops varies with the position of the primordium on the plant. Starting from the first leaf, the following sequence of flowers has been observed: underdeveloped male, normal male, normal female, inhibited male, giant female, and parthenocarpic female. Climatic factors modify the length but not the order of each phase. High temperatures and long days tend to keep the vines in the male phase, whereas low temperatures and short days speed up the development, so that the female phase is reached after a much smaller number of nodes. Temperatures of day and night are not interchangeable. *Cucumis sativus* L. var. Boston pickling cucumber, and *Cucumis anguria* L.

(small gherkin) reacted to temperature and daylength in the same way. From these results it is clear that when both normal male and female flowers are needed on the same vine, environmental conditions should be chosen that will maintain the plant between the " lower limit of female flowers " and the " lower limit of inhibited male flowers ". In order to secure female flowers it is possible to compensate the long summer days by low night temperatures, but in order to secure a maximum crop the effect of temperature on growth rate must also be taken into consideration. [From authors' summary.]—Calif. Inst. Technol., Pasadena 4.

2567. LEEPER, P. W.
Growth and days from first net to maturity of Rio-Sweet cantaloupe.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 199-200.

The first net appeared around the blossom end 78 days after planting. Measurements showed that an average of 49·95% of the total growth of the fruit occurred after this stage. Growth continued up to maturity which was reached in an average of 23·19 days from the first net stage. 80·64% of the fruit matured during a 3-day period from the 22nd to the 24th day after the first net stage.—Texas agric. Exp. Stat.

2568. SCHNEIDER, A.
Über ein vereinfachtes Verfahren der Gewinnung von Gurkensamen. **(A simplified method of cucumber seed extraction.)**
Züchter, 1951, **21**: 136-7, bibl. 2, illus.

Technical ammonia (25%) is added to cucumber seed at the rate of 12 c.c. to 1 l. and stirred in vigorously. After 15-20 min. water is added to the overflow, and the first lot of slime and fruit pulp is removed. Water is sprayed on the mass and stirring is continued. When the operation is finished impurities float to the top and the healthy, mature seed sinks to the bottom of the container. The seed is then released at the bottom and treated with hydrochloric acid to restore its natural colour. The acid is removed by rinsing twice in water and the seed is dried. The whole procedure and the apparatus used are simple and inexpensive and seed so cleaned gave a higher percentage germination than that cleaned by the usual hand method.

2569. LINSER, H., AND PELIKAN, W.
Bor-Kalkammonsalpeter. **(Boron-calcium ammonium nitrate.)**
Bodenkultur, 1951, **5**: 459-66, bibl. 13, illus.

Sand culture experiments with cucumber showed that this newly developed fertilizer supplies available boron to the plant in sufficient quantities.

2570. BELL, T. A.
Pectolytic enzyme activity in various parts of the cucumber plant and fruit.
Bot. Gaz., 1951, **113**: 216-21, bibl. 19.

The pickle industry suffers considerable loss as a result of a softening of cucumber salt-stock caused by a pectin-splitting enzyme. An investigation into the source of this enzyme showed that it occurs in the plant and fruits of cucumber (*Cucumis sativus*). The enzyme of the cucumber was strongly active in the seeds, staminate and pollinated pistillate flowers, and ripe fruit, but was not found in the unpollinated flowers, leaves, petioles, and stems. Enzyme activity was weak to negative in the eight stages of cucumber development of immature fruit. Pectolytic enzyme activity was absent in the green tomato (*Lycopersicon esculentum*) including the embryo with flowers and six stages of green-fruit development. High activity of the enzyme was found in the red ripe tomato fruit.—Food Fermentation Invest. Lab., Raleigh, N.C.

2571. ADSUAR, J., AND CRUZ MIRET, A.
Virus diseases of cucumbers in Puerto Rico.
Tech. Pap. P.R. agric. Exp. Stat. Rio Piedras **6**, 1950, pp. 14, bibl. 7, illus. [received 1952].

From this first study of the viruses attacking cucurbits in Puerto Rico it appears that two well defined types, designated viruses A and B, exist. These are compared with common cucumber mosaic virus and Wellman's southern celery virus I; viruses A and B differ from the type virus described by Doolittle, but virus B is shown to be a strain of the type virus. Transmission by aphids of both viruses was accomplished in a limited number of cases. A.C.S.

2572. WILES, A. B., AND WALKER, J. C.
Epidemiology and control of angular leaf spot of cucumber.
Phytopathology, 1952, **42**: 105-8, bibl. 9.

Angular leaf spot (*Pseudomonas lachrymans*) frequently becomes sporadic on cucumbers in Wisconsin. The cotyledonary lesions, which are the source of primary inoculum, develop when infected seed is germinated. Spattering and wind-blown rain and surface drainage water are effective agents of dissemination; pickers and cultivation equipment are important means of spread when the vines are wet. Experiments showed that the pathogen infected host plants over a fairly wide range of temperature. Disease severity increased with an increase in air and soil temperature up to 28° C., but moisture is regarded as the most important environmental factor. No treatment so far tried is sufficiently effective as an eradicant and, until a method for complete eradication of the pathogen is devised, emphasis should be given to finding areas for cucumber seed production where climate effectively prevents seed contamination and infection.—Univ. of Wisconsin.

2573. MCKEEN, C. D.
Investigations of fusarium wilt of musk melons and watermelons in southwestern Ontario.
Sci. Agric., 1951, **31**: 413-23, bibl. 12, illus.

Within the last decade, fusarium wilt of muskmelons and watermelons has invaded the chief melon-growing area of Essex County in southwestern Ontario, where, on several farms, crop losses up to 75% have been recorded. Tests showed that isolates from muskmelon could attack watermelon seedlings and that isolates from watermelon caused some wilting of muskmelon seedlings. Seed treatment with thiram controlled pre-emergence rot but not early post-emergence wilt.—Lab. Plant Path., Harrow, Ontario.

2574. FABRICATORE, J. A.
Intumescenze su frutti di cocomero (*Citrullus vulgaris* L.). **(Swellings on water-melon fruits.)** [English summary ½ p.]
Boll. Staz. Pat. veg., Roma 1949 (issued 1951), **7**: 93-9, bibl. 5.

In 1948 many water-melon fruits in Venetia showed

two disorders causing severe losses. The most prevalent type, showing as pale green or brownish pustules, consisted of swellings which originated in one of the cortical layers or in the vascular tissues or even in the first layers of the pith. The hypertrophied groups of cells of the various tissues often coalesced. The disorder is thought to be connected with the high humidity during the exceptionally rainy season. The second type of disorder was due to infection by *Colletotrichum* sp. which caused circular spots on the surface of the fruits.

2575. KIHARA, H.
Triploid watermelons.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 217-30, bibl. 12, illus.

Investigations on the breeding of seedless watermelons, carried out in various parts of Japan since 1939, are described.

2576. LANA, E. P., AND TISCHER, R. G.
Evaluation of methods of determining quality of pumpkin for canning.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 274-8, bibl. 3, being *J. Pap. Ia agric. Exp. Stat.* **J-1911.**

An attempt was made to apply objective tests to fresh, blanched and processed pumpkin to determine which tests might provide a reliable measure of their suitability for canning. Of 6 methods tried the Adams consistometer was found to give a reliable measure of consistency of the canned product from fresh samples. The other tests, while presenting some interesting possibilities, did not prove efficient in pre-determining canning quality.

2577. WHITAKER, T. W., AND BOHN, G. W.
Isolation requirements of squashes and pumpkins.
Seed World, 1952, **70**: 5: 10, 53, bibl. 1.

The most important varieties of the 4 species of *Cucurbita* (*C. pepo*, *C. maxima*, *C. mixta* and *C. moschata*) cultivated for food, fodder and ornamental purposes in the U.S. are listed. As the varieties of any one species are cross-fertile they require adequate isolation when grown for seed production. Interspecific compatibility varies. One variety each of the following pairs of species can be grown together: *C. pepo* and *C. maxima*, *C. maxima* and *C. mixta*, and *C. mixta* and *C. moschata*.

2578. GAGNARD, J.
Utilisation de la courge de Siam en horticulture. (**The Siam gourd in horticulture.**)
Rev. hort. Algér., 1951, **55**: 40-2, bibl. 5.

Cucurbita ficifolia, usually grown as an ornamental plant, is generally believed to be a native of Asia, but it is here stated to have come originally from Mexico. Its flowers, fruit, and seeds are described, and brief notes are given on its cultivation. In recent trials it was found that the climate in Algeria was suitable for the fruit to reach maturity and ripen seed.

Legumes.

(*See also* 2081, 2085, 2532, 2682k, 2683a, b, d, 2733.)

2579. JUSTICE, O. L.
Report of the Fluorescence Committee.
Proc. int. Seed Testing Ass., 1951, **16**: 346-9.

The Gentner fluorescence test is being used in Canada and Scandinavia and elsewhere for the identification of certain varieties of field peas and potato tubers. "The committee is of the opinion that there is not sufficient information available to establish procedures for testing these kinds of seeds and tubers for fluorescence and recommends additional research."

2580. MULDER, E. G.
Molybdenum in relation to nitrogen fixation of leguminous crops.
Trans. 4th int. Congr. Soil Sci., Amsterdam 1950, Vol. II, pp. 124-7, bibl. 5 [received 1952].

The effect on nitrogen fixation of molybdenum was studied at Groningen in experiments with peas, beans and clover in deficient, transported, Australian soils and acid lowmoor peat. The clovers (white and red) responded to molybdenum application in both soils, whereas peas and beans gave normal fixation without application of molybdenum.

2581. SREENIVASAN, A., AND WANDREKAR, S. D.
Excretion of vitamin C during germination of leguminous seeds.
Proc. Indian Acad. Sci. Sect. B, 1951, **34**: 267-71, bibl. 14.

In trials with seeds of *Phaseolus radiatus*, *Lens esculenta* and *Pisum arvense* it was found that, during a period of soaking lasting up to 15 hours which preceded germination, small but measurable amounts of ascorbic acid were excreted. During subsequent germination over a period of 8 days excretion became negligible.

2582. ANDERSSON, I., AND OSSIANNILSSON, F.
Försök med Pestox 3 som betningsmedel. (**Experimental seed treatment with Pestox 3.**)
Växtskyddsnotiser, 1951, No. 5-6, pp. 84-8, illus.

In pursuance of Chao-Sang Tsi's experiments [*H.A.*, 21: 1657] the authors treated the seeds of some agricultural and horticultural crops, including peas, garden and field beans and potato tubers with shradan. In every case the maximum safe concentration was first determined. The insecticide was then applied to two lots of seed sown at different dates at maximum and half strength. The treatment was effective at both concentrations on peas (0·25 and 0·50%) and field beans (0·50 and 1%), which were protected against the pea aphid and the green peach aphid for at least 25 and 39 days respectively after sowing. The experiments with potatoes were inconclusive, while garden bean seedlings were injured by the insecticide even at very low concentrations.

2583. WATSON, R. D., COLTRIN, L., AND ROBINSON, R.
The evaluation of materials for heat treatment of peas and beans.
Plant Dis. Reptr, 1951, **35**: 542-4.

Of the materials tested, carbon tetrachloride appeared to be the most suitable seed treating material for Tendergreen beans, Thomas Laxton peas and Clark bush lima beans. Their seeds were able to survive long exposure to hot carbon tetrachloride (boiling point 76·8° C.), while they were killed in a relatively short time when treated in water of the same temperature. Lima beans were more resistant to hot water

than were the other seeds tested.—Idaho agric. Exp. Stat.

2584. Nyhlén, Å.
Försök med sprit- och märgärter i södra och mellersta Sverige år 1938-1948. **(Trials with round and wrinkled garden peas in southern and central Sweden in 1938-1948.)** [English summary 1 p.]
Medd. Trädgårdsförs. Malmö **67**, 1951, pp. 25, bibl. 8.

In these trials conducted in 10 localities the late varieties were shown to give the highest percentage of shelled peas. Some varieties gave poorer yields in the eastern part of the country, with hot dry summers, than in the south and west. To obtain maximum yields peas should be sown as soon as the soil is ready for cultivation. Recommendations are made for the best early, medium and late varieties.

2585. Schneider, A.
Untersuchungen über die Eignung von Erbsensorten für Zwecke der Nasskonservierung. **(Investigations on the suitability of pea varieties for canning and bottling.)**
Züchter, 1951, **21**: 97-107, bibl. 17, illus.

Observations on numerous pea varieties have shown that cloudiness and gelatinization depend, not only on the method of sterilization and starch content, but also on varietal physiological differences. In varieties well suited for preserving the total sugar content during a storage period of 4 days decreased uniformly, whereas in other varieties the rate of sugar reduction diminished with length of storage period. This is probably due to transformation of starch into sugar as a result of carbohydrate metabolism owing to lack of nutrients. The knowledge of these relationships made it possible to breed strains suitable for canning, including the newly released high grade pea, Quedlinburger Konservenperle.

2586. DeZeeuw, D. J., and Andersen, A. L.
Response of pea varieties to dry and slurry methods of seed treatment.
Phytopathology, 1952, **42**: 52-6, bibl. 17, illus.

Pea varieties differ in resistance to soil-borne pathogens. Generally the varieties most susceptible to damping-off responded best to seed treatment. All the fungicides used, Arasan, Spergon, Phygon XL, and Ceresan M, were beneficial to susceptible peas under most conditions. Of all varieties tested, Alaska Wilt-Resistant was the most sensitive to injury when given moderate and light treatments of Ceresan M in water or Methocel slurry. [For preliminary report see *H.A.*, 21: 2614.] —Michigan State College.

2587. Hagedorn, D. J.
Experiments with pea seed protectants in Wisconsin.
From abstr. in *Phytopathology*, 1952, **42**: 10.

Results indicated that Arasan, KF467, Phygon, and Spergon were significantly more effective than Arasan SF, Dow 9B, or Phygon XL.

2588. Barber, H. N., and Paton, D. M.
A gene-controlled flowering inhibitor in *Pisum*.
Nature, 1952, **169**: 592, bibl. 4.

Evidence is presented by the University of Tasmania indicating that the time of flowering in garden peas is controlled by the presence or absence of an inhibitor, probably of a hormonal nature. The experimental technique is described.

2589. Temme, J.
Enkele resultaten van twee bemestingsproefvelden. **(Some results of two fertilizer experiments.)** [English summary ¼ p.]
Landbouwk. Tijdschr., 1950, **62**: 362-8 [received 1952].

Experiments were carried out on a fertile sandy soil and on a poor sandy soil in Holland to determine the cumulative effect over a period of 3 years of different combinations of the sulphates of K, Na, Mg and Ca on the growth of oats and peas. The addition of K, Na and Ca depressed yields of both crops, probably by causing a reduced intake of Mg. In a soil low in Mg, the Mg deficiency symptoms became more severe as the ratio Mg/other cations decreased. On poor sandy soil with a pH of 5·0, the highest yield of peas was obtained when K_2SO_4 and $MgSO_4$ were applied together.

2590. Stalder, L.
Über Dispositionsverschiebungen bei der Bildung von Wurzelknöllchen. **(The changes in reaction during the development of root nodules.)**
Phytopath. Z., 1952, **18**: 376-403, bibl. 29.

A method is described by which the effect of external conditions (N-content, P-content, and temperature of the nutrient solution) on the infectivity and on the growth of the root nodules of *Pisum sativum* can be determined quantitatively. A nitrogen-concentration of 0·32 g. N in 1,000 c.c. nutrient solution (2N-solution) reduces infectivity by about 40%; while the same concentration completely inhibits growth of nodules. Thus nitrogen alters infection and the reaction of the host plant. Phosphoric acid does not affect the susceptibility of the host to infection but stimulates nodule growth. Reduced attacks by the nodule organism are noticeable at about 27° C. Temperatures as low as 6·5° C. do not affect infection. The optimum temperatures for the growth of the nodule organism, of the host and of the nodules are about 20 to 24° C.

2591. Arens, K.
Uma doença da ervilha (*Pisum sativum* L.) causada por fatores meteorológicos. **(A disorder of peas due to meteorological factors.)** [English abstract ½ p.]
Lilloa, 1949, **21**: 61-6, bibl. 7, illus. [received 1952].

A disorder of garden peas, characterized by deformation and reduction of leaflets, is described and illustrated. In extreme cases only the rachis develops without leaflets or tendrils. The principal factors producing the symptoms were found to be high humidity combined with high temperatures and prolonged contact of the undeveloped leaflets with rain water. The disorder could be induced artificially. An investigation showed that rain penetrates the buds and stomata of the leaflets when they are unprotected by wax. The flooding of the air spaces in the very young tissue reduces respiration and favours the

development of bacteria. High temperatures accentuate these effects so that the embryonic cells are injured or killed.

2592. Kerling, L. C. P.
Beschadiging en schimmelaantasting bij erwten als gevolgen van nachtvorst. **(Damage and attack by fungi as consequences of late frosts on peas.)** [English summary 1¼ p.]
Tijdschr. PlZiekt., 1952, **58**: 29-54, bibl. 31, illus.

Ten-day-old pea plants (variety Rondo) grown in pots, were exposed in a refrigerator to temperatures of −3 to −4° C. for 16 hours, then incubated at 10-20° C., and the damage noted. Plants smaller than 1½-2 in. were less sensitive to frost than plants of about 4 in., while plants 6 in. high were easily damaged and did not recover. The frost-injured plants were inoculated with one of the following fungi: *Botrytis cinerea*, *Sclerotinia sclerotiorum*, *Fusarium avenaceum*, *F. solani*, and *Ascochyta pinodella*, and the course of the attack on the tissues recorded. In each case frost injury rendered the plants more subject to attack by these organisms. When tissues became water-congested they were also more easily attacked by the fungi mentioned. In seed-treatment tests phygon, a seed protectant, stimulated growth and the cotyledons were protected against attacks from soil fungi. Those plants which expended their food-reserves over a long period were the more vigorous and more able to withstand low temperatures and fungus attack.

2593. Wallace, G. B., and Wallace, M. M.
Bacterial blight of peas.
E. Afr. agric. J., 1951, **17**: 16-18, bibl. 3, illus.

The recent appearance of a destructive bacterial disease of field pea and sweet pea in the Northern Province of Tanganyika Territory is reported. The organisms present are still under investigation; 2 species of *Pseudomonas*, one pathogenic, have been found associated in this local disease, one being possibly *P. pisi*. The symptoms are described and preventive and control measures discussed. A.C.S.

2594. Cruickshank, I. A. M.
Pea wilt: field identification and varietal resistance.
N.Z. J. Agric., 1952, **84**: 144, bibl. 3, illus.

When in N. Zealand crops of peas have been grown repeatedly in fields infected by pea wilt (*Fusarium orthoceras* var. *pisi*) and soil infection has become general complete crops may be destroyed. The optimum soil temperature for the development of the disease is 18-22° C. Wet soils favour early development of symptoms, but drier soils favour the rapid death of infected plants. Alkaline soils, pH 8·0, are most favourable to wilt development. Over the last 3 years trials have been carried out with local and imported varieties of peas to determine their resistance or susceptibility to local isolates of pea wilt, and the results recorded for garden, field, canning, and sugar varieties. Control measures mentioned are: 1. seed for resowing should not be taken from diseased crops, 2. seed should be treated with a certified fungicidal seed dressing, 3. crop refuse should be destroyed, 4. a crop rotation of 4 to 5 years should be practised to slow down spread, and 5. fields known to be infected with pea wilt should be sown only with wilt-resistant varieties.

2595. Barker, J. S., and Tauber, O. E.
Fecundity of and plant injury by the pea aphid as influenced by nutritional changes in the garden pea.
J. econ. Ent., 1951, **44**: 1010-12, bibl. 1, being *J. Pap. Ia agric. Exp. Stat.* **J-2005.**

Results of pot experiments carried out at Ames, Iowa, suggest that under field conditions peas grown on nutrient deficient soils would be injured more severely by *Macrosiphum pisi* than would plants grown on fertile soils, the weaker plants being less tolerant of feeding injury. The reproductive ability of the aphid appeared to be reduced on the severely injured plants.

2596. Guzman, V. L., and Paez, J.
Experimentos comparativos de variedades de vainitas. **(Variety trials with snap beans.)**
Foll. misc. Of. Estud. espec., Secret. Agric. Mexico, 1950, No. 3, pp. 84-9, from abstr. in *Turrialba*, 1951, **1**: 157.

Six varieties of snap bean were compared in Peru in 1946 and 1947. Kentucky Wonder was the best, followed by Bountiful Wax, Plentiful and Stringless Black Valentine.

2597. Hoffman, J. C., and Kanapaux, M. S.
Wade, a new all purpose snap bean.
Seed World, 1952, **70**: 2: 38-9, 46, illus.

This new American variety, suitable for home gardens and for canning, freezing, and transport for fresh market, is available to growers for the first time this year. It is resistant to common bean mosaic, to pod mottle virus, and New York 15 virus, and is tolerant of powdery mildew.

2598. Theau, A.
Le haricot riz. **(The rice haricot.)**
Rev. hort. Algér., 1951, **55**: 8-10.

The rice haricot bean (*Phaseolus acutifolius*) is described as a useful market garden plant and the method of cultivating it is described. It is more digestible than the haricot, has a greater volume when cooked, and keeps better, being immune to attacks by the bean weevil [*Bruchus obtectus*].

2599. Toole, E. H.
Relation of seed processing and of conditions during storage on seed germination.
Proc. int. Seed Testing Ass., 1951, **16**: 214-27, bibl. 9, illus.

The author summarizes his conclusions drawn from a review of the literature and from his own experiments with snap bean seed as follows: " . . . Most crop seeds will lose viability very rapidly at humidities approaching 80 per cent and at temperatures of 25° to 30° C. On the other hand, seed can be kept for 10 years or longer without loss of viability or vigour at a humidity of 45 to 50 per cent, and temperatures of 5° C. or lower. Harvesting and later processing of beans cause not only ' baldheads ' and other grossly abnormal seedlings, but slight injuries that can be detected in the seedlings only by careful examination. It is suspected that under unfavourable storage conditions these slight mechanical injuries predispose the

seed to more rapid deterioration than occurs in uninjured seed, although preliminary results do not confirm this view. Abnormal seedlings are caused, not only by mechanical injury, but also by other factors that result in the death of organs or parts of organs before the death of the entire seed or seedling." —U.S. Bureau of Plant Industry, Washington.

2600. GATES, R. R.
Epigeal germination in the Leguminosae.
Bot. Gaz., 1951, **113**: 151-7, bibl. 12, illus.

Epigeal and hypogeal germination in *Phaseolus vulgaris* and *P. multiflorus*, respectively, constitute a pair of inter-specific genes. By germinating the seeds of the garden bean and the scarlet runner in various positions, it was found that the hypocotyl of the latter is not at first geotropically sensitive but may grow out in any direction. This is supported by the recent finding that the hypocotyl in seedlings of *P. vulgaris* does not contain diffusible auxin. On the other hand, the primary root which develops from the tip of the hypocotyl is always positively geotropic. There is no evidence on why the zone of growth is above the attachment of the cotyledons in one species and below it in the other, but distribution of auxin in the very young seedlings is presumably involved. The forms of germination found in the various tribes of the Leguminosae are reviewed. [From author's summary.] —Biol. Lab., Harvard University.

2601. TOOLE, V. K., WESTER, R. E., AND TOOLE, E. H.
Relative germination response of some lima bean varieties to low temperatures in sterilized and unsterilized soil.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 153-9, bibl. 3, illus.

Laboratory trials are described in which seeds of several lima bean varieties were sown in sterilized and unsterilized soil kept at temperatures of 15, 20, 25 and 30° C. to measure cold hardiness and resistance to rotting. In unsterilized soil at 15° C. Giant Calico generally showed significantly higher germination than Fordhook, Henderson and Jackson Wonder, thus indicating resistance both to low temperature and rhizoctonia. At 15° C. germination of all the varieties was better in sterilized than in unsterilized soil. In addition to Giant Calico, Fordhook and Peerless germinated particularly well in sterilized soil at 15° C. The rotting of seeds of Fordhook and of one strain of Jackson Wonder in unsterilized soil appears to be associated with the presence of a sunken area on the inner face of the cotyledon.—Plant Industry Stat., Beltsville.

2602. DU CREHU, G.
Réaction des variétés de haricot grain aux différentes techniques de semis. (**The effect of different planting methods on bean varieties grown for seed.**)
Ann. Amél. Plantes, 1951, **1**: 408-33, bibl. 6.

Three planting distances were chosen to study the effect of plant density on growth, seed yield and seed quality in several dwarf bean varieties, viz. (1) 4 cm. in the row (50 plants per m²), (2) 10 cm. in the row (20 plants per m²) and (3) 4 plants in a group with a distance of 25 cm. between the groups (32 plants per m²). The preliminary practical conclusion drawn from the mass of data collected in 2-3 years' trials is that close planting produced the highest yields per area. If the average of two years of treatment (2) is expressed as 100, (1) yielded 119·7 and (3) 108·0, the significant difference being 9·0. None of the treatments had any influence on seed quality or seed uniformity.—Station d'Amélioration des Plantes, E.N.A. de Rennes.

2603. LENANDER, S.-E.
Gödslingsförsök med spritbönor. (**Fertilizer trials with beans.**) [English summary ¾ p.]
Medd. Trädgårdsförs. Malmö **68**, 1951, pp. 11, bibl. 7.

In trials on phosphate deficient soil with pH 6·5 to 6·8 at Rånna Experimental Station, applications of calcium nitrate and superphosphate significantly increased the yield of beans, *Phaseolus vulgaris nana* variety Stella, whereas potash reduced it.

2604. LÖHNIS, M. P.
Manganese toxicity in beans.
Trans. 4th int. Congr. Soil Sci., Amsterdam 1950, Vol. I, p. 226 [received 1952].

A note on two different symptoms both induced by manganese in toxic amounts, one of which is similar to iron chlorosis and does not occur naturally in the field [see also *H.A.*, 21: 3207].

2605. GUYER, R. B., AND KRAMER, A.
Objective measurements of quality of raw and processed snap beans as affected by maleic hydrazide and para-chlorophenoxyacetic acid.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 263-73, bibl. 9, being *Sci. Publ. Md agric. Exp. Stat.* (*Dep. Hort.*) **A313.**

Para-chlorophenoxyacetic acid (CLPA) was applied as a liquified gas aerosol at levels of 0·1, 0·3 and 0·9% to 3 varieties of snap bean when the beans had reached the 4% seed stage of maturity. The plots were harvested 4, 7 and 10 days later. CLPA slowed down maturation by retarding seed and fibre development without reducing yields, but it also adversely affected quality as measured by colour, flavour and pod shape. Maleic hydrazide was also applied to 3 varieties as an aqueous solution at 0·04, 0·2 and 1·0% at full bloom and the early pod stages. It had a retarding effect on seed and pod development but reduced both yield and quality markedly.

2606. AFANASIEV, M. M., AND MORRIS, H. E.
Bean virus 2 (yellow) on Great Northern bean in Montana.
Phytopathology, 1952, **42**: 101-4, bibl. 8.

Bean plants infected with a virosis occurring on Great Northern bean, a variety resistant to bean virus 1, develop drooping of leaflets, chlorotic spotting, and later general mottling, distortion, and crinkling of leaves; they gradually become rugose, dwarfed, and spindly, grow slowly, bloom late, and yield poorly. The virus is not transmitted through the seed. The properties of the virus indicate that this disease is caused by bean virus 2.

2607. DIMOND, A. E., STODDARD, E. M., AND CHAPMAN, R. A.
Chemotherapeutic investigations on the common bacterial blight of beans.
Phytopathology, 1952, **42**: 72-6, bibl. 19.

A method was developed whereby the potency of a compound used as a chemotherapeutant for the

bacterial blight of beans, caused by *Xanthomonas phaseoli*, may be measured by bioassay. A number of compounds were evaluated as chemotherapeutants for the disease. All those of value have known bactericidal or fungicidal potency.—Conn. agric. Exp. Stat.

2608. Mitchell, J. W., Zaumeyer, W. J., and Anderson, W. P.
Translocation of streptomycin in bean plants and its effect on bacterial blights.
Science, 1952, **115**: 114-15, bibl. 6.

Twelve antibiotics were applied in lanolin in amounts of about 0·2 mg. to the internodes of Black Valentine beans immediately above the cotyledons. When the primary leaves were inoculated 3 days later with *Pseudomonas medicaginis* var. *phaseolicola* or *Xanthomonas phaseoli* infection did not develop or developed only mildly on plants that had been treated with streptomycin sulphate or dihydrostreptomycin sulphate. Terramycin hydrochloride reduced the severity of the symptoms produced by both organisms, and aureomycin hydrochloride had a similar effect on xanthomonas; both, however, injured the plants and suppressed growth. Streptomycin sulphate applied to the soil had no effect on the incidence or severity of *Pseudomonas*, nor did plants treated with this antibiotic accumulate enough in their seeds to affect the susceptibility of seedlings developing from them.

2609. Brock, R. D.
Resistance to angular leaf spot among varieties of beans.
J. Aust. Inst. agric. Sci., 1951, **17**: 25-30, bibl. 7.

The reaction of 164 lines of beans to angular leaf spot caused by *Isariopsis griseola* was tested by artificial inoculation. All the varieties tested were arranged in 5 classes according to their susceptibility. Although no variety was completely immune, the 11 highly resistant varieties showed no defoliation or typical lesions. All the varieties in the resistant classes and most of those in the susceptible class were either field beans or runner beans; class 5, highly susceptible, contained the largest number of varieties, viz. 80. The writer indicates the possibility of breeding a resistant dwarf green-pod variety of bean. A.C.S.

2610. Goidànich, G., and Camici, L.
Diffusione e dannosità della *Macrophomina phaseolina* (Tassi) G. Goid. esistente quale polifago parassita in Italia. (**The distribution of, and the damage caused by, *Macrophomina phaseolina*, which exists as a polyphagous parasite in Italy.**) [English summary 1½ pp.]
Boll. Staz. Pat. veg. Roma, 1947 (issued 1950), **5**: 81-116, bibl. 44, illus.

The international literature on the parasite is reviewed, the morphological characters and the parasitism of the fungus on beans are described, and the geographical distribution of the disease, the damage it causes, and control measures are discussed. On beans it results in the complete destruction of the root system, a discoloration around the root collar, and a general rot destroying the whole plant. Control measures aiming at the elimination of the microsclerotia are not effective, and indirect methods, such as the prompt removal of diseased plants, soil disinfection, and the use of seed from plants grown in soil free from infestation, would appear to yield more satisfactory results.

2611. Venkatakrishnaiya, N. S.
***Phytophthora parasitica* on French bean *Phaseolus vulgaris* Linn.**
Indian J. agric. Sci., 1950, **20**: 391-4, bibl. 6, illus.

A form of phytophthora, believed to be *P. parasitica*, observed for the first time on French beans in Bangalore, was not specific like *P. phaseoli*, but in inoculation tests infected castor bean, tomato, eggplant, okra and potato, but not chilli, carrot or radish.

2612. Zeid, M. M. I., and Cutkomp, L. K.
Effects associated with toxicity and plant translocation of three phosphate insecticides.
J. econ. Ent., 1951, **44**: 898-905, bibl. 11, being *Pap. sci. J. Ser. Minn. agric. Exp. Stat.* **2676.**

The toxicity to two-spotted spider mite, *Tetranychus bimaculatus*, and translocation in broad beans of octamethylpyrophosphoramide (OMPA), 0,0-diethyl 0-p-nitrophenylphosphate (para-oxon) and parathion were investigated at the University of Minnesota. Although parathion and para-oxon were effective against mites through the toxicity of their vapours, OMPA was more readily translocated in the plant and remained toxic longer. Translocation was found to be greater in a downward direction, and greatest in actively growing young plants. Absorption and translocation of OMPA and para-oxon appeared to cause chemical changes in the plants similar to those induced by 2,4-D and related compounds, the effect being more pronounced in plants grown in sunlight.

2613. Brittingham, W. A., and Mortensen, J. A.
Varietal differences in shellout percentages in the Southern pea, *Vigna sinensis*.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 257-62.

In a two year study with 12 varieties of Southern peas varietal differences in both hand shellout percentages and machine shellout percentages were found. The hand shellout percentages ranged from 60·7 to 73·1%. Great differences among varieties were found in response to machine shelling, with machine shellout percentages ranging from 32·2 to 63·6%. The per cent loss in potential yielding ability due to machine shelling ranged from 8·5 for Extra Early Blackeye to 47·4 for Brown Crowder. Fresh yields from two year trials with the same 12 varieties were expressed in three different ways: 1. gross pod weight; 2. shelled peas by hand; and 3. shelled peas by machine. It was found that varieties change relative rank every time a different basis is selected. [Authors' summary.]—Texas agric. Exp. Stat.

Mushrooms.

2614. Bouillenne, M., and Evrard, L.
Influence de certaines substances hormonales sur la croissance du mycélium de *Agaricus hortensis* (Cooke). forma *albida* Lange. (**The influence of certain growth substances on the growth of the mycelium of *Agaricus hortensis* (Cooke) f. *albida* Lange.**)
C.R. Rech. I.R.S.I.A. No. 6: Trav. Centre Rech. Hormones vég. (1949-50), 1952, pp. 127-34, bibl. 1, illus.

The mycelium of *Agaricus hortensis* was grown in a modified Treschow medium, without heteroauxin, and the effect of adding various growth substances at biological and reactive concentrations was studied. After 16 days a stimulation of growth was observed only with β-indoleacetic acid at 10γ °/₀₀. Indolepropionic acid, in reactive concentrations (5-50 mg./l.), caused an almost complete inhibition of growth, an effect considerably more marked than that of indoleacetic acid at the same concentrations. Indolebutyric acid and 2,4-D appeared to have no effect at any concentration.

2615. Edwards, R. L.
Mushroom composts and mushroom growth.
Chem. Ind. Lond., 1951, No. 26, pp. 558-9.
An abstract of a paper read to the Agriculture Group of the Society of Chemical Industry with a report of the subsequent discussion.

2616. Cairns, E. J.
Nematode diseases and their control in mushroom crops.
From abstr. in *Phytopathology*, 1952, **42**: 4.
The sources of nematode infestation are the manure compost, the mushroom house and bed structures, and the casing soil. The best control is heat. Between crops, the house and bed structures are water-soaked for 24-48 hours to activate dormant nematodes, then disinfested by steam or steam plus formaldehyde.

2617. Martínez, A.
Agaricáceas nuevas para la Argentina. **(Agaricaceae new to Argentina.)** [English abstract 4 lines.]
Lilloa, 1949, **21**: 43-52, illus. [received 1952].
Macro- and microscopical descriptions are given of 5 species of mushroom not previously recorded in Argentina, i.e. *Coprinus radians*, *Panaeolus solidipes*, *Agaricus subrufescens*, *Pluteus nanus* var. *lutescens* and *Lepiota echinella* var. *asperula*. Their eating qualities are mentioned.

Onions.

(*See also* 2532, 2683c, 2733.)

2618. van Beekom, C. W. C.
De ui, zijn herkomst, geschiedenis en economische betekenis. **(The origin, history, and economic significance of the onion.)** [English summary 13 lines.]
Meded. Dir. Tuinb., 1952, **15**: 140-4, illus.
The part played by the onion in ancient times is outlined. In the Netherlands onions are grown mainly in small holdings in the coastal provinces of North-Holland, South-Holland, and Zeeland where their cultivation is of great economic importance. Great Britain has been the largest buyer, but Germany and, since 1948, France also import large quantities. Their cultivation in Holland has a promising future if only attention is given to improving quality (by better storage and the selection of suitable varieties) and by rigid standardization.

2619. Andrew, W. T.
Vegetative reproduction of onions by the headset method.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 208-12, bibl. 6, illus.
Clipping off onion inflorescences at the base of the pedicels at various stages of development resulted in the formation of bulbils suitable for vegetative propagation. Treatment at an early stage of inflorescence development proved easier than when the spathes had opened, though there was little difference in the number of sets produced. The application of several growth substances resulted in little or no increase in the number of sets formed. Among 4 varieties tested, one, a short season strain of Early Yellow Globe, did not produce sufficient bulbils to justify the method.—Southern Ill. Univ.

2620. Roberts, R. H., and Struckmeyer, B. E.
Observations on the flowering of onions.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 213-16, bibl. 13, illus.
Studies at the University of Wisconsin have shown that a vegetative bud forms during the storage of onion bulbs at the same time as a flower scape is developed. Subsequently, depending on such factors as photoperiod and temperature, either a flower stalk from the scape or a vegetative shoot from the accessory bud develops. In the latter case the scape aborts or a partially formed flower stalk reverts to a vegetative type of growth, which sometimes produces bulbils. Because of scape abortion the number of seed stalks formed by an onion cannot be regarded as a measure of flower development or of the degree of induction which preceded flowering.

2621. Bremer, A. H.
Korleis skal ein i praksis nytta ut dei reaksjonar vanleg lauk (*Allium cepa*) har for ymse daglengder. **(Short day treatment of onions in Norway.)** [English summary 1½ pp.]
Meld. norg. LandbrHøgsk., 1950, **30**: 185-206, bibl. 6, illus. [received 1952].
Discusses the application of short day treatment to the production of onions from sets and from seed at latitudes above 60°. The yield increase was very considerable as compared with control plants grown entirely under natural daylight conditions.

2622. McKeen, C. D.
An occurrence of rot of Spanish onion seedlings caused by *Botrytis allii*.
Sci. Agric., 1951, **31**: 541-5, bibl. 7, illus.
Botrytis allii was found attacking young onion seedlings in late May and early June of 1948 in a field at Leamington, Ontario. Infection and decay of young transplants were favoured by low soil temperatures; the highest mortality occurred at 15° C. and was progressively lower at 20° and 25° C.—Lab. Plant Path., Harrow, Ontario.

2623. Arnala, R.
Sipulin naattihomeen torjunnasta. **(Downy mildew control in onions.)** [German summary ¾ p.]
Maataloust. Aikakausk., 1951, **23**: 67-78, bibl. 12.

Thirty per cent of the experimental material, commercial onion sets, were found to be infected with *Peronospora destructor* and to yield no crop. Heat treatment at 40° C. for 3 hours before planting out gave complete control of the disease and had a stimulating effect on growth. Even an exposure of 48 hours to this temperature did not cause any injury to the plants. Hot water treatment at 40° C. for 1 hour also killed the fungus without damage to the plant, but no beneficial influence of the treatment was apparent. Lime-sulphur+2% white oil emulsion controlled downy mildew effectively but caused severe spray injury. Bordeaux (1·5 : 2 : 100)—2% white oil emulsion proved less effective but did not damage the foliage so badly. [The legends of the tables are in Finnish and German.]—Helsinki Univ.

2624. Newhall, A. G., and others.
Control of onion blast and mildew.
From abstr. in *Phytopathology*, 1952, **42**: 15.

From 3 to 12 applications of liquid nabam-type carbamate (Dithane D-14) or its zineb dust counterpart (Dithane Z-78) plus an insecticide for thrips control were made at approximately weekly intervals with power sprayers and dusters on onion farms in New York State, beginning late in June. Treated onions remained green 2-4 weeks later and yielded an average of 162 bags (of 50 lb.), or 26% more than the control.

2625. Newhall, A. G., Rawlins, W. A., and Sloan, M. J.
Control of onion maggot and smut by one treatment at seeding time.
From abstr. in *Phytopathology*, 1952, **42**: 15.

The addition of an insecticide to the 4% methyl cellulose solution used in coating onion seed with the fungicide Tersan for onion smut control has resulted in successful control of the onion maggot, *Hylemyia antiqua*, in field tests. Chlordane and Heptachlor were the most effective materials tried, the quantities required being less than 100 g. technical to a pound of seed per ⅓ or ½ acre.

2626. Shirck, F. H.
Hibernation of onion thrips in southern Idaho.
J. econ. Ent., 1951, **44**: 1020-1.

Studies extending over 5 years showed that onion thrips, *Thrips tabaci*, overwinter principally as adults, and mainly on alfalfa and clover. No correlation was found between the size of the overwintering population and the severity of the subsequent infestation of the onion crop.

2627. Ildis, —.
L'entreposage frigorifique des oignons secs. Résultats de la campagne 1950-1951. **(The cold storage of dry onions. Results in the 1950-51 season.)**
Terre maroc., 1952, **26**: 20-2.

Preliminary trials in Morocco have shown that onions can be kept successfully in cold storage at 0·5 to 4° C. during the winter, and that, provided the bulbs are initially of good quality, the increased price received in the spring more than covers the cost of storage and the comparatively small amount of wastage.

Radishes.

(*See also* 2066.)

2628. Kurokami, T., and Takematsu, T.
Experimental studies on phytohormones. II. Comparison of phytohormone treatments between spraying on foliage of radishes and seed immersion before setting in the field of the same. [Japanese, with English summary 8 lines.]
Tech. Bull. Kawaga agric. Coll., 1949, **1**: 2: 17-20, bibl. 9.

Both seed treatment and foliage spraying of radish with K salts of α-naphthaleneacetic acid resulted in deep depressions forming on either side of the neck of the root. The effect was most pronounced with the seed treatment.

2629. Kasai, T.
Transmission of the mosaic disease of Japanese radish by *Myzus persicae* Sulz. [Japanese with English summary.]
Ann. phytopath. Soc. Japan, 1950, **15**: 1: 3-6, from abstr. in *Rev. appl. Mycol.*, 1952, **31**: 97.

Single, non-viruliferous aphids of *Myzus persicae* acquired the mosaic virus of Japanese radish by feeding for 5 min. on diseased plants, while viruliferous individuals infected healthy plants on which they fed for the same period. The aphids were found to retain their capacity for transmitting the virus after 3 but not after 5 hours.

Salad crops.

(*See also* 2530, 2682f, o.)

2630. Bohn, G. W., and Whitaker, T. W.
Recently introduced varieties of head lettuce and methods used in their development.
Circ. U.S. Dep. Agric. **881**, 1951, pp. 27, bibl. 21, illus., 15c.

The characteristics and the breeding and selection methods used in the development of 4 lettuce varieties, Great Lakes and Imperial 456, 410 and 17, released since 1941, are described. Characteristics of head lettuce are discussed in relation to breeding procedures and genetics.

2631. Harrington, J. F., and Thompson, R. C.
Effect of variety and area of production on subsequent germination of lettuce seed at high temperatures.
T[ruck] C[rops] Mimeo Univ. Calif. **51**, 1951, pp. 7, bibl. 3.

Samples of lettuce seed from California and Arizona, representing 12 varieties and 9 growing areas, were germinated at 24, 26, 28 and 30° C. Varietal differences in germination at 26° C. were consistent in 1948 and in 1950, Imperials 456, 17, 101 and Great Lakes showing better germination than Imperial 44 and D, and Imperial 615 showing the poorest germination. Essentially the same results were obtained at 28° C., although the mean germination was much lower. The area in which the seed had been produced had a significant effect on its germination at high temperatures. Highly significant positive correlations were

established between the germination percentages and the temperatures 10 or 30 days preceding harvest. It is probable that negative correlations exist between germination percentages and relative humidities of the areas of production.

2632. MADARIAGA, F. J., AND KNOTT, J. E.
Temperature summations in relation to lettuce growth.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 147-52, bibl. 12.

Temperature sums based on degree-days above a minimum of 40° F. and below a 70° F. maximum were calculated for 56 fields of lettuce in the Imperial Valley in one year and for 333 fields in the Salinas Valley over 4 years. In the former, where planting is done over a short period, degree-days multiplied by the average day length gave consistent totals. In the Salinas Valley, however, where plantings are made over 9 months, both the sums for degree-days alone or multiplied by the average day length varied greatly from month to month, though fairly consistent as between one year and another for any given month between March and August. Although the average figures for degree-days multiplied by day length for the two areas, 19,480 and 19,400 respectively, agreed closely, the data indicate that lettuce does not use the same amount of heat to reach maturity when planted at different times of the year.

2633. VAN DER KLOES, L. J. J.
Het randen van sla. **(Tipburn in greenhouse lettuce.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1952, **15**: 125-39, bibl. 13, illus.

Tipburn in lettuce is influenced by all factors that affect absorption of water and transpiration from the leaves. It is stimulated by (1) a low atmospheric humidity at a relatively high temperature, (2) too vigorous growth, the leaf surface being too large for the size of the plant, (3) poor soil structure, (4) an acid or dry soil or one with a high concentration of salt, (5) too much fertilizer, especially nitrogen, (6) fertilizers with too much impurity, (7) a soil with too little soluble potash and magnesia. No fully resistant varieties are known, but there is considerable varietal variation.

2634. FRIEDMAN, B. A.
Soft rot of lettuce and escarole caused by *Pseudomonas marginalis*.
From abstr. in *Phytopathology*, 1952, **42**: 112.

Bacteria, considered to be identical with *Pseudomonas marginalis*, were isolated from leaves of plants of Arizona-grown head lettuce (*Lactuca sativa*) and Florida-grown escarole (*Cichorium endivia*) found affected with a slimy soft rot upon examination at the New York market.

2635. ROLAND, G.
Sur une maladie à virus du cresson (*Nasturtium officinale*). **(A virus disease of watercress.)**
Parasitica, 1952, **8**: 1-3, bibl. 6, illus.

A virus disease of watercress was found in a watercress bed at Jemeppe-sur-Sambre, Belgium, in October, 1950. The affected leaves showed a yellowish mosaic, sometimes as small rings on the laminae. In November the symptoms were visible only on the oldest leaves but they reappeared on the young leaves in January. Aphids (*Myzus persicae*) found on diseased plants transmitted the disease to healthy cress plants but not to leaves of tobacco, thornapple and pepper (*Capsicum annuum*). The virus here described does not conform to three viruses recorded on watercress by other workers; hence it is considered to be a new watercress virus for which the name *Nasturtium virus* 1 is proposed. —State Phytopathology Station, Gembloux.

Spinach.

(*See also* 2682h, w, x.)

2636. VAN STAALDUINE, D.
Welke mogelijkheden biedt Cavallius spinazie voor de teelt onder glas ? **(Is it possible to grow Cavallius spinach under glass ?)** [English summary ½ p.]
Meded. Dir. Tuinb., 1952, **15**: 223-34, bibl. 7, illus.

The spinach variety Cavallius Giant is promising as a late autumn or early spring variety. It thrives much better during short days and is less susceptible to downy mildew (*Peronospora spinaciae*), and grey mould (*Botrytis cinerea*). One disadvantage, however, is its susceptibility to frost damage. It can be sown in heated houses from early November and in cold houses from late November onward. The quantity of seed sown per are [=1/40 of an acre] is 5·5 to 6 lb. The spinach can be cut in heated houses from early February and in cold houses from mid-February onward. A late autumn crop can be grown successfully both under Dutch lights and in glasshouses. The seed can be sown from late September onward until mid-October, and the crop cut from early November until mid-December. For a winter crop the spinach can be cut from unheated houses from mid-December to early February, but the risk of frost damage is high. If it is necessary to cut early because of frosts the yield will usually not be high enough to cover the cost of production.

Sweet corn.

(*See also* 2682b.)

2637. STEVENSON, F. V., WOLF, E. A., AND BREGGER, T.
A preliminary report on the testing of sweet corn for resistance to *Helminthosporium turcicum* Pass. at the Everglades Experiment Station in 1950-51.
Plant Dis. Reptr, 1951, **35**: 488.

Leaf blight of sweet corn, caused principally by *Helminthosporium turcicum* Pass., appears to threaten seriously the future of corn production in southern Florida. Breeding experiments have been carried out aiming at the development of single crosses resistant to the disease. Fifty-two inbreds showed some resistance individually or in various hybrid combinations, and three of these inbreds were highly resistant.—Everglades Exp. Stat., Belle Glade, Florida.

2638. STONER, W. N.
A report on the influence of spray additives on control of *Helminthosporium turcicum* Pass. in the Everglades.
Plant Dis. Reptr, 1951, **35**: 487-8.
In trials for testing the effect of additives used with zineb to control leaf blight of sweet corn, it was found that, under the conditions of the experiment, none of the preparations used appreciably increased fungicidal effect.—Everglades Exp. Stat., Belle Glade, Florida.

2639. TOWNSEND, G. R.
Control of the leaf blight and rust diseases of sweet corn.
Plant Dis. Reptr, 1951, **35**: 368-9.
From the data tabulated it is shown that both leaf blight (*Helminthosporium turcicum*) and rust (*Puccinia sorghi*) were well controlled by the application of dithane dusts where the schedule was suitable. The disease ratings were lowest where the 10% dust was used regularly throughout 11 applications.

2640. VICKERY, V. R.
Control of insect pests in sweet corn.
88th A.R. N.Scotia Fruit Grs' Ass. 1951, pp. 79-81.
For the control of earworm, corn borer and fall armyworm attacking sweet corn in Nova Scotia DDT is recommended, used either as an emulsion with summer oil spray, as a spray of 2 lb. of 50% wettable powder per 100 gal., or as 5% dust. The latter two formulations can be used in small gardens as well as in commercial plantings. Treated corn stalks should not be fed to livestock.

2641. ANDERSON, L. D., AND OTHERS.
Studies on control of corn earworm on sweet corn in southern California in 1949.
J. econ. Ent., 1951, **44**: 905-9, bibl. 5, being *Pap. Calif. Citrus Exp. Stat.* **691.**
In 22 experiments made to control corn earworm, *Heliothis armigera*, on sweet corn, individual ear spray treatments with an emulsion of 1% DDT in 5 or 10% mineral oil gave the best results. A 1% DDT-oil injection came next, and individual ear treatments with 3% DDT third. Broadcast DDT-dust treatments gave unsatisfactory results. The injection treatment, however, injured the silks, and ear damage occasionally resulted from the oil emulsion spray. To obtain maximum effects from DDT dust treatments, at least 3 applications must be made at not more than 3-day intervals, beginning within a day or two after the appearance of the silk. No DDT residues were found on the edible portion of the ears.

2642. ANDERSON, L. D., AND OTHERS.
Investigations of corn earworm control on sweet corn in California in 1950.
J. econ. Ent., 1951, **44**: 966-71, bibl. 5, being *Pap. Calif. Citrus Exp. Stat.* **692.**
Although practical control of moderate populations of corn earworm may be obtained by the usual DDT spray or dust treatments, heavy infestations were found to require individual ear treatment, using 5% DDT dust at the rate of 30-40 lb. per acre at 3-day intervals beginning as soon as the silks appeared and repeated three or four times. An emulsion spray containing 0·75% DDT and 5-10% mineral oil applied twice at the rate of 1·5 c.c. per ear at 5-day intervals 3-4 days after the appearance of the silk also gave good control.

Sweet potatoes.

(*See also* 2682c.)

2643. MULLIN, R. S.
Control of cracking in sweet potato by soil fumigation.
From abstr. in *Phytopathology*, 1952, **42**: 15.
In soil fumigation tests to control cracking in sweet potatoes in eastern Virginia, dichloropropenedichloropropane was put into the soil with a hand injector in five 15×50 ft. replications. Results of the 1950 experiment with the variety Porto Rico were 14·69% of potatoes cracked in the treated areas, and 51·18% in the non-treated.

2644. SUMMERS, E. M.
Witches broom (ishuku-byo) of sweet potatoes in the Ryukyu Islands (second report).
Plant Dis. Reptr, 1951, **35**: 494.
A survey party confirms the seriousness of the virus disease mentioned in an earlier report [*H.A.*, 22: 1585], and makes recommendations to the U.S. Civil Administration of the islands concerning detailed surveys to delimit occurrence of the disease, quarantine measures to halt its spread, attempts to produce certified virus-free planting material, cultural practices that promise some relief, and a research programme.

2645. SHERMAN, M.
The control of sweetpotato insects.
Agric. Ext. Circ. Hawaii agric. Ext. Serv. **320**, 1952, pp. 2.
The pests concerned are the vine borer *Omphisa anastomosalis*, the weevils *Euscepes postfasciatus* and *Cylas formicarius elegantulus* and the Chinese rose beetle *Adoretus sinicus*. Control measures involving field sanitation and the use of DDT are described. [See also *H.A.*, 22: 1586.]

2646. VIALE, E.
Combate del gorgojo del camote (*Rhyssomatus* sp. Curculionidae). (**Control of the sweet potato weevil.**) [English abstract 17 lines.]
Turrialba, 1951, **1**: 247-51, illus.
Lindane, aldrin and dieldrin were tested at the Interamerican Institute of Agricultural Sciences, Turrialba, for control of the sweet potato weevil (*Rhyssomatus* sp.). Lindane applied at the rate of 40 g. active principle per 100 sq. m. resulted in a considerable increase in total weight of roots harvested, but the percentage of infested roots was high. Aldrin and dieldrin, applied at the rates of 40 g. and 30 g. active principle per 100 sq. m. respectively, resulted in considerable increase in total weight of roots harvested, greater size of individual roots, and much reduced percentage of weevil damage. The insecticide content of treated roots is being investigated.

2647. EZELL, B. D., AND WILCOX, M. S.
Influence of storage temperature on carotene, total carotenoids and ascorbic acid content of sweetpotatoes.
Plant Physiol., 1952, **27**: 81-94, bibl. 28.

The carotene, total carotenoids, ascorbic acid, and moisture content, and the weights of Yellow Jersey, Nancy Hall, Porto Rico (Unit I Strain), and Orange Little Stem sweet potatoes were determined at harvest, after curing, and at intervals during storage at 50, 55, 60, and 70° F. Storage temperature and variety are major factors in determining the behaviour of the carotenoid pigments during storage. Nancy Hall sweet potatoes decreased in carotene and total carotenoid pigments during storage at all temperatures. The other varieties studied tended to decrease in carotene and total pigments when stored at 50° F. At 55° F. there was little change while at 60° F. and 70° F. the increases were appreciable and of nutritional significance. The ascorbic acid content of sweet potatoes was not greatly affected by storage temperatures, the tendency in general being for it to decrease fairly rapidly during the first two to three months in storage and to approach a common level before the storage season was over. The average ascorbic acid content after two to three months in storage was about one half to two thirds that at harvest. The temperature of storage had little effect on the moisture content of sweet potatoes. When held at 85% relative humidity losses in weight were least at 60° F., slightly greater at 55° F., and still greater at 50° and 70° F. [Authors' summary.]—Plant Industry Station, U.S.D.A., Beltsville, Md.

Tomatoes.

(*See also* 2099, 2110, 2530, 2682d, e, j, m, n, q, r, t, 2683e, 3186, 3199, 3215.)

2648. Finlay, K. W.
Hybrid vigour in tomatoes.
J. Aust. Inst. agric. Sci., 1951, **17**: 145-51, bibl. 12.

This reports a field trial of 11 F_1 hybrids and 11 parent varieties—virtually the first work in Australia on the possibility of using the vigour of such hybrids for increasing commercial production. Several hybrids gave highly significant increased early and total yields when compared with their higher producing parent; one gave 51% more (of good quality fruit) than its parent, which was the highest yielding local variety. As regards fruit size, the hybrids closely approximated to the geometric mean of their parents. With many lines of male-sterile tomatoes to hand, back-crossing male sterility factors into promising parents and the use of the Cottrell-Dormer pollinator may render the economic production of hybrid seed feasible: A.C.S.

2649. Cásseres, E. H., and Linares, P. J.
Producción de variedades de tomates para los trópicos húmedos. **(The breeding of tomato varieties for the humid tropics.)** [English abstract 12 lines.]
Turrialba, 1950, **1**: 7-11, bibl. 1, illus. [received 1952].

A breeding programme was initiated at the Inter-American Institute of Agricultural Sciences in Turrialba, Costa Rica, to develop tomato varieties resistant to *Phytophthora infestans* and producing high yields under conditions of high temperature and high humidity. The Turrialba variety was developed by selection among segregating progenies of Cuban Marglobe × a wild tomato of Costa Rica. It produced higher yields in Turrialba than Master Marglobe, Stokesdale, Southland, Bonny Best, Rutgers, San Marzano and other varieties tested. Tomato lines yielding better than Turrialba were obtained by selection from segregating progenies of Turrialba × Bonimar from Australia, Turrialba × Institute Introduction No. 2313 (a wild tomato variety from Colombia), and Bonimar × Introduction No. 2313. None of the lines showed any appreciable resistance to infection with *Phytophthora infestans* when spores were sprayed on the young plants. [From English abstract.]

2650. Rick, C. M.
Hybrids between *Lycopersicon esculentum* Mill. and *Solanum lycopersicoides* Dun.
Reprinted from *Proc. nat. Acad. Sci.*, 1951, **37**: 741-4, bibl. 5.

F_1 hybrids have been obtained, by the use of embryo culture, between the tomato and *Solanum lycopersicoides*, a perennial nightshade. Pollen and ovule fertility were very low but it was possible to secure progeny from the backcross to the tomato parent. The author discusses the opportunities for further research in breeding and genetics opened up by the feasibility of obtaining *Lycopersicon-Solanum* hybrids.

2651. Smith, P. G., and Zink, F. W.
Effect of sucrose foliage spray on tomato transplants.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 168-78, bibl. 3, illus.

In laboratory and field trials at the University of California, Davis, tomato plants were sprayed on each of 3 days before transplanting with a 10% sucrose solution plus a spreader. Non-hardened or partially hardened plants were able to absorb, store and utilize sucrose. When carbohydrate depletion was induced by storage in the dark or by high metabolism rates due to high temperatures at planting, the treated plants showed lower mortality and shock than controls. With well hardened plants the treatment had no appreciable value. Observations on the appearance of the plants and on root regeneration are recorded. [See also *H.A.*, 22: 1596.]

2652. Lana, E. P.
Tolerance of tomatoes to maleic hydrazide.
Proc. 7th annu. Mtg N. centr. Weed Control Conf. 1950, Milwaukee, Wis., pp. 61-2.

In trials in Iowa maleic hydrazide was applied to tomatoes in the hope that, by retarding the growth of the main stem, laterals would be forced, and the plant would bear more flower clusters at approximately the same time, and give more ripe fruit at the first harvest than could be obtained from normally grown plants. Results so far obtained show all treated plants to be smaller than the untreated controls, the size decreasing with increase in concentration and giving corresponding yield depressions.

2653. Randhawa, G. S.
Effect of synthetic growth-regulators on fruit-set and maturity of early market field tomatoes.
Indian J. Hort., 1951, **8**: 4: 21-33, bibl. 8.

Spraying of flower clusters of tomatoes with various growth substances did not increase total yields of out-

door tomatoes, though when p-chlorophenoxyacetic acid, 25 and 50 p.p.m., was used early yield was increased. The average weight per fruit in the early yields was increased by flower cluster spraying. A large increase in early fruits was also obtained by spraying whole plants with *L*-o-chlorophenoxypropionic acid (25 p.p.m.). The trials were carried out in 1947 and 1948.

2654. Zalik, S., Hobbs, G. A., and Leopold, A. C.
Parthenocarpy in tomatoes induced by para-chlorophenoxyacetic acid applied to several loci.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 201-7, bibl. 14, illus., being *J. Pap. Ind. agric. Exp. Stat.* **514.**

Para-chlorophenoxyacetic acid (PCA) was applied at 500, 1,000 and 1,500 p.p.m. in a lanolin paste to either the stigma, one side of the ovary, the entire stylar end of the ovary or the abscission layer of young flowers of tomatoes. All treatments induced parthenocarpy, fruit set occurring even when the point of application was as much as 4½ in. from individual flowers. All 3 rates of application accelerated maturity significantly and the 2 higher rates produced increases in the weight of fruits. Characteristic abnormalities were common following the application of PCA to different loci and these are described.

2655. Vaníček, V.
Vliv 2,3,5-trijodbenzoové kyseliny na výnos a ranost rajských jablíček. **(The effect of 2,3,5-triiodobenzoic acid on the fruitfulness and earliness of tomatoes.)** [English and Russian summaries 7 and 10 lines respectively.]
Sborn. čsl. Akad. Zěmed., 1951, **24**: 259-68, bibl. ½ p., illus.

In field trials conducted by the Botanical Institute, Brno, tomato plants, variety Danish Export, sprayed with triiodobenzoic acid at the rate of 25-100 mg. per litre gave 64% higher yields and matured 2-3 weeks earlier than the controls.

2656. Davis, L. E.
Survey of California canning tomato harvesting operations, 1951.
Truck Crops Mimeo. Univ. Calif. **52**, 1951, pp. 14, illus.

A survey of tomato harvesting methods in California showed that 20% of the total harvesting time was spent in the handling of materials. Preliminary tests have shown that the use of conveyor belts in the field can result in a 15-25% saving in time and 25-30% reduction in labour. It is recommended that cross-row and in-row conveyers should be developed and tested, and that bulk methods of handling, to eliminate the use of lugs in the field, should be adopted. The possibility of mechanical harvesting at the end of the season should be investigated and varieties more suitable for mechanical harvesting developed. Immediate steps which can be taken to improve productivity include the use of 2-man crews for picking, one picker on each side of a row, picking directly into lugs instead of into buckets, selecting and training the pickers, and improving working conditions.

2657. Marx, T.
Über die l-Ascorbinsäure-Konzentration in Tomaten. **(The l-ascorbic acid concentration in tomatoes.)**
Landw. Forsch., 1952, **3**: 176-205, bibl. 11.

In an earlier experiment [*ibid.* 1950, **2**: 74] the fact was established among others, that there is no correlation between the size of the tomato and its ascorbic acid content. Further trials at Berlin-Dahlem with 6 tomato varieties have shown that the ascorbic acid content varied between varieties, but in all of them increased with the increasing height of the truss. The varieties did not react uniformly to weather conditions. In the three of those observed, sunshine appeared to influence the ascorbic acid content in some varieties more than in others. The highest ascorbic acid concentration was found in the fruit flesh, the lowest in the skin.

2658. Reynard, G. B.
Inherited resistance to radial cracks in tomato fruits.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 231-44, bibl. 36, illus.

All widely grown commercial varieties tested proved susceptible to radial cracking, but the variety Crack-Proof showed a high degree of resistance. Progeny trials showed that resistance was hereditary, being apparently recessive to susceptibility. New strains were developed combining resistance with large fruit size and satisfactory yield. The severity of radial cracking among susceptible varieties in 1950 was found to be more closely associated with the number of days on which rain fell shortly before picking than with the amount of rain in the same period.

2659. Ciccarone, A., and Carilli, A.
Nota preliminare sulle osservazioni attualmente in corso intorno ad alcuni avvizzimenti del pomodoro, con qualche cenno sull'azione concomitante di un eriofide: *Vasates destructor* (K). **(Preliminary notes on a tomato wilt and a mite associated with it: *Vasates destructor*.)** [English summary 1 p.]
Boll. Staz. Pat. veg. Roma, 1949 (issued 1951), **7**: 131-57, bibl. 37, illus.

A tomato wilt, widespread in southern and central Italy, is described. The wilt affects the plants from July onwards, when the third cluster is about to turn red, especially on the common varieties San Marzano, Fiaschello and Lampadina. It has generally been attributed to systemic fungous infections, but the authors believe it to be of a more complex nature and summarize the various causes which appear to be associated with it, including climatic factors (such as exceptional dryness), cultural operations, unbalanced nitrogen fertilizers, closeness of planting, lack of seed selection, the continued planting of old varieties, and misuse of irrigation water. The most important pests associated with the wilt are eelworm (*Heterodera marioni*), red mite, and tomato russet mite (*Vasates destructor*). Leaf parasites are *Oidiopsis sicula* and especially *Alternaria solani*. Important systemic fungi are *Fusarium bulbigenum lycopersici* and *Verticillium albo-atrum*. Measures of control are discussed.

2660. CICCARONE, A.
Sintomi di " virescenza ipertrofica " (big bud) del pomodoro nei pressi di Roma.— Nota preliminare. **(Preliminary note on the big bud disease of tomato in the neighbourhood of Rome.)** [English summary 4 lines.]
Boll. Staz. Pat. veg. Roma, 1949 (issued 1951), **7**: 193-8, bibl. 17, illus.

A tomato disease, noticed in the summer of 1950 near Rome, is provisionally attributed to Smith's lycopersicum virus 5 (big bud). Previous literature is briefly reviewed with special reference to control—by growing resistant varieties, the destruction of wild hosts and treatment with DDT.

2661. DOOLITTLE, S. P., AND ALEXANDER, L. J.
Occurrence of tobacco etch virus on greenhouse tomatoes in Ohio.
Plant Dis. Reptr, 1951, **35**: 351-3, bibl. 2, illus.

Inoculation tests with six tomato plants suffering from severe leaf necrosis showed that they were infected by a combination of tobacco mosaic virus, cucumber mosaic virus, and tobacco etch virus (*Marmor erodens* Holmes).

2662. RAYCHAUDHURI, S. P.
Retention of strains of tobacco mosaic virus in tomato seeds.
From abstr. in *Phytopathology*, 1952, **42**: 114.

Only tomato seedlings raised from seeds stored for one week were found infected with the strains of virus associated with internal browning. Stored seeds from tomatoes infected with the ordinary strain of tobacco mosaic virus, however, retained the virus for 27 days. Dry seeds from tomatoes affected by internal browning disease retained the virus externally for at least 2 weeks, although the amount of virus was much reduced.

2663. LINK, G. K. K., AND GODDARD, D. R.
Studies on the metabolism of plant neoplasms. I. Oxygen uptake of tomato crown-gall tissues.
Bot. Gaz., 1951, **113**: 185-90, bibl. 2, being *Contr. Hull. bot. Lab.* **629.**

A comparative manometric study was made, from the seedling stage until flowering, of the oxygen uptake of the hypocotyl of the normal tomato plant, and of the same organ inoculated with *Agrobacterium tumefaciens*. Calculated on a basis of fresh weight, the rates of oxygen uptake of slices of crown-gall tissues were at all times greater than those of slices of the control tissues. The rates of oxygen uptake by both control and tumorous tissues, especially of the latter, appear to be in part functions of the stage of development of the tissues at time of slicing. Total nitrogen does not appear to be a more adequate basis than fresh weight for calculating the rates of oxygen uptake of crown-gall and control tissues. [From authors' summary.]

2664. LINK, G. K. K., AND KLEIN, R. M.
Studies on the metabolism of plant neoplasms. II. The terminal oxidase patterns of crown-gall and auxin tumors of tomato.
Bot. Gaz., 1951, **113**: 190-5, bibl. 10, being *Contr. Hull bot. Lab.* **630.**

1. Carbon monoxide-inhibition studies were made of the oxygen uptake of normal tissues and crown-gall tissues of the hypocotyl and internodes and of auxin-induced tumors of the internodes of tomato. 2. The results indicate that iron and copper enzymes and enzymes not yet identified mediate oxygen uptake in the tissues studied. 3. The percentages of oxygen uptake mediated by these enzymes are the same for tissues of the normal hypocotyl, internodes, and stumps of bisected internodes at two stages of development. 4. In the crown-gall tissues a percentage shift occurred in favour of the copper enzymes at the expense of both the iron and the residual enzyme systems. In the auxin tumour the percentage of oxygen uptake mediated by both iron and copper enzymes was increased at the expense of the residual systems. [Authors' summary.]

2665. CICCARONE, A., AND CARILLI, A.
Osservazioni di campo su *Corynebacterium michiganense* (Smith) Jensen e considerazioni su un possibile caso di sua sopravvivenza nel terreno. **(Field observations on *Corynebacterium michiganense* and a discussion on a possible case of its survival in the soil.)** [English summary $4\frac{1}{2}$ lines.]
Boll. Staz. Pat. veg. Roma, 1948 (issued 1950), **6**: 177-9, bibl. 5, illus.

An unexpected serious infection of tomatoes by *Corynebacterium michiganense*, the cause of tomato bacterial canker, is reported as occurring in southern Italy and Sicily. The particularly early outbreaks in 1950 are pointed out and a case of the possible survival of the bacterium in the soil from 1946 to 1950 is recorded.

2666. CICCARONE, A.
Prove di lotta contro *Cladosporium fulvum* Cooke. **(Trials for the control of *Cladosporium fulvum*.)** [English summary 9 lines.]
Boll. Staz. Pat. veg. Roma, 1948 (issued 1950), **6**: 195-9, bibl. 9.

Fungicidal tests for the control of tomato leaf mould were carried out in greenhouses near Genoa. Thiuram-disulphide (Tulisan) 0·2%–0·35% gave the best results. Fermate and Parzate were less effective, and some scorching was caused by Parzate. In variety trials the variety Improved Bay State showed resistance (one spot on 50 leaflets), but the fruit is too small to be satisfactory and the variety was affected by verticillium wilt.

2667. GÄUMANN, E., KERN, H., AND SAUTHOFF, W.
Untersuchungen über zwei Welketoxine. **(Investigating two wilt toxins.)**
Phytopath. Z., 1952, **18**: 404-15, bibl. 8, illus.

The disturbance caused by the lycomarasmin-iron-complex to the uptake of water and the transpiration of tomato stems corresponds exactly with that produced by pure lycomarasmin. In both cases the application of the toxin causes a reduction of the water uptake and of transpiration (shock phase), and necroses and inrolling of the margins of the leaves followed by wilting. It cannot be assumed, however, that the lycomarasmin is converted within the host tissues to the lycomarasmin-iron-complex. Alternaria acid produced

by *Alternaria solani* causes disturbances in the uptake of water and in transpiration similar to those brought about by lycomarasmin and the lycomarasmin-iron-complex, but at greater dilution, thus showing that it is an even more potent toxin than lycomarasmin.

2668. Daines, R. H., Leone, I., and Brennan, E.
The effect of fluorine on vegetation when applied through the substrate or in the atmosphere as influenced by plant nutrition and environmental factors.
From abstr. in *Phytopathology*, 1952, **42**: 112.

Plants absorb fluorine both from the atmosphere and from the soil, thereby accumulating abnormally high fluorine contents often resulting in the development of typical symptoms of F toxicity. Different species vary in the minimum concentration of F necessary to produce visible injury, in their capacity for F uptake, and in the relation between F content and extent of injury. In experiments with tomato, plants in optimum growing conditions with respect to nitrogen, calcium, and phosphorus tend to be more susceptible to fluorine injury from the soil and, to a lesser extent, from the atmosphere. As the pH of the soil is increased by the addition of lime, the degree of fluorine toxicity and the amount of fluorine absorbed by the plants is reduced. Conditions conducive to greater degree of injury and fluorine absorption are high atmospheric humidity, turgidity of the plant, and wetting of the plant surfaces. Atmospheric fluorine results in a high leaf and low root content; soil fluorine causes a high leaf and even higher root content.

2669. Mackay, J. H. E.
Fusarium wilt of tomato. The effect of level of nutrition on disease development.
J. Aust. Inst. agric. Sci., 1951, **17**: 207-11, bibl. 6.

Nutrition trials gave no clear evidence that fertilizer application could do more than check the severity of the disease. Results of soil trials were inconsistent while others, in sand, showed that added nutrients, though decreasing the severity of the disease, only postponed death. A.C.S.

2670. Bloom, J. R.
Effect of nutritive sprays on the development of fusarium wilt of tomato.
From abstr. in *Phytopathology*, 1952, **42**: 3.

Tomato plants were grown in a balanced nutrient solution and inoculated with *Fusarium oxysporum* f. *lycopersici*. Afterwards they were given supplementary nutrient by spraying the foliage with various concentrations of sucrose, urea plus sucrose, KCl plus sucrose, and NaH_2PO_4 plus sucrose. With sucrose alone and with sucrose plus urea the disease index increased with rise in concentration from 0·1 to 0·7 molar. A decided but less gradual rise occurred with KCl plus sucrose. NaH_2PO_4 plus sucrose had no significant effect.

2671. Keyworth, W. G., and Dimond, A. E.
Root injury as a factor in the assessment of chemotherapeutants for fusarium wilt.
From abstr. in *Phytopathology*, 1952, 42: 113.

Certain types of injury to the roots of tomato plants before their inoculation with *Fusarium lycopersici* resulted in greatly reduced disease severity. The injuries mentioned included the application of sub-lethal doses of chemicals. It appears from the results obtained that the disease reduction was effected by the injury *per se* and not from the action of any specific treatment.

2672. Johnson, J. C.
Phoma rot of tomatoes.
Qd agric. J., 1951, **73**: 339-41, illus.

In Queensland during seasons of high rainfall this disease, caused by *Phoma destructiva*, may cause serious fruit wastage both in the field and during transit to market. Symptoms are described and illustrated. Control involves sanitary measures and the regular application of copper dusts or sprays, both in the seed bed and in the field.

2673. Younkin, S. G., Merwarth, F. L., and Hoadley, A. D.
Control of gray leaf spot and anthracnose of tomato.
From abstr. in *Phytopathology*, 1952, 42: 114.

Tests for the control of gray leaf spot (*Stemphylium solani*) which had occurred in epiphytotic proportions in certain States during 1949-1951, and of tomato anthracnose (*Colletotrichum phomoides*), showed that seven applications of manganese ethylene bisdithiocarbamate, zineb, ziram, and tribasic copper sulphate reduced the incidence of infection by *Stemphylium*, while manganese ethylene bisdithiocarbamate and ziram were equally effective in controlling anthracnose.

2674. Peay, W. E., and Blood, H. L.
Cavities and thrips within tomato fruits.
Seed World, 1952, **70**: 7: 20, 22, bibl. 1, illus.

Results of investigations conducted in Utah indicated that the number of cavities in tomatoes was correlated with the size of the blossom end through the opening of which the thrips gain entrance. Breeding for fruit with small blossom ends is recommended for control. [See also *H.A.*, 19: 3183.]

Sundry plants.

2675. Porter, D. R., and Younkin, S. G.
Yolo Wonder pepper.
Seed World, 1952, **70**: 3: 8, 50, illus.

A descriptive note on a new tobacco-mosaic-resistant variety of sweet pepper obtained by crossing the susceptible California Wonder with the Italian resistant variety Elephant Trunk. While Yolo Wonder is susceptible to other viruses infecting peppers, losses caused have been relatively unimportant.

2676. McKeen, C. D.
A species of *Aphanomyces* causing damping-off in peppers and certain other vegetables.
From abstr. in *Phytopathology*, 1952, **42**: 14.

A fungus corresponding closely to *Aphanomyces cladogamus* was isolated from damped-off pepper seedlings. The fungus was able to cause damping-off of tomatoes, radish, and eggplant, but was not observed to attack lettuce, onion, or muskmelon seedlings. Damping-off in peppers, as caused by this fungus, was much more effectively controlled by treating the

seedbed soil with thiram than by treating the seed, with thiram.

2677. Ranjan, S., and Kaur, R.
Hormone induced parthenocarpy in *Hibiscus esculentus* and *Solanum melongena*.
Curr. Sci., 1951, **20**: 69-70, bibl. 4, illus.

Pre-anthesis spraying of okra flowers with 0·5% indolebutyric acid, 0·01% methyl naphthoxy acetate [MNA] and 0·1% chlorophenoxy acetic acid resulted in the development of seedless fruit. Applied as a paste to the cut end of the style, α-naphthaleneacetic acid [NAA] at 0·05 to 1% caused shedding, but several other hormones caused fruit development, though the fruit was rather smaller than that of the controls. Treatment at anthesis produced similar results, though with larger and sometimes partially seeded fruits, except that NAA at 0·1% and 0·2% caused fruit development instead of shedding. Post-anthesis applications of several hormones resulted in larger fruits than the controls. With egg plant pre-anthesis applications of 0·01% and 0·001% MNA as a spray and 0·2% NAA as a paste resulted in the formation of seedless fruit.

2678. Capoor, S. P., and Varma, P. M.
Yellow vein-mosaic of *Hibiscus esculentus* L.
Indian J. agric. Sci., 1950, **20**: 217-30, bibl. 19, illus.

Studies on the symptoms of yellow vein-mosaic of *bhendi* [okra] and on its transmission, insect vectors and host range are described. Arising from these studies suggestions for control include: (i) the eradication of the wild host *Hibiscus tetraphyllus*; (ii) observing a close season of at least 2 months between successive okra crops; (iii) roguing diseased plants at an early stage of infection; (iv) spraying with fish oil rosin soap against the white fly vector, *Bemisia tabaci*, and (v) keeping the land clear of weeds, many of which are food plants of the white fly.

2679. Panigrahi, G.
Photoperiodic studies in Indian vegetables. 2. *Amaranthus gangeticus* var. *oleraceus* Roxb.
Curr. Sci., 1951, **20**: 19, bibl. 2, illus.

Seed was sown on 10 February and the plants subjected to different day-lengths until 30 April. Under a 6-hr. photoperiod flower buds were formed in 32 days compared with 39 days for plants growing in normal illumination. Plants receiving 12, 18 and 24 hrs. illumination remained vegetative. Under 18-hr. illumination they made the best growth. Under 24-hr. illumination apical dominance disappeared and the leaves shrivelled.

2680. Hougas, R. W., Rieman, G. H., and Stokes, G. W.
Resistance to white rust in horseradish seedlings.
Phytopathology, 1952, **42**: 109-10, bibl. 3, illus.

White rust (*Albugo candida*) causes heavy losses in the important horseradish-producing areas of the United States. In hybridization trials more than 200 seedlings have been grown and tested for resistance to this disease. Test plants were grown from root cuttings of the seedlings. A wide range of susceptibility to the disease was evident and three classes of host-parasite reaction were established: A. Plants with resistance comparable to that of the Bohemian variety. B. Plants with a higher degree of resistance than the Bohemian variety. C. Plants more susceptible than the Bohemian variety. The distribution of the hybrid seedlings in classes A, B, and C was 4, 3, and 162 respectively, that of the Bohemian selfs was 9, 8 and 31.—U.S. Dep. Agric.

2681. Tarjan, A. C.
Awl nematode injury on Chinese water-chestnuts.
From abstr. in *Phytopathology*, 1952, **42**: 114.

In an extensive planting of the Chinese waterchestnut, *Eleocharis dulcis*, in the south-eastern United States, plants showing symptoms of decline were found to be infested with awl nematodes, *Dolichodorus heterocephalus*. Counts of the nematode from the soil in which plants had been growing indicated that these nematodes found *E. dulcis* a suitable host and had reproduced on it.

Noted.

2682.

a Ahlberg, O.
Bekämpningsförsök mot kålflugor och morotfluga. **(Experiments on the control of cabbage root fly and carrot fly.)**
Växtskyddsnotiser, 1951, No. 4, pp. 58-61.
One year's small-scale trials with proprietary chemicals.

b Anderson, L. D., and Gunther, F. A.
Sampling techniques for determination of DDT residue on sweet corn.
J. econ. Ent., 1951, **44**: 1008-10, bibl. 6.

c Cooley, J. S.
The sweet potato—its origin and primitive storage practices.
Econ. Bot., 1951, **5**: 378-86, bibl. 22.

d Coste, A.
Observations sur la culture de la tomate San Marzano en Algérie. **(Observations on the culture of the San Marzano tomato in Algeria.)**
Fruits et Prim., 1951, **21**: 48-51, bibl. 7.
With particular reference to blossom end rot [see also *H.A.*, **22**: 1602].

e Currence, T. M., Fogle, H., and Moore, J. F.
Breeding tomatoes for ascorbic acid content.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 245-53, bibl. 7, being *Pap. sci. J. Ser. Minn. agric. Exp. Stat.* **2266.**

f Eddy, B. P., and Mapson, L. W.
Some factors affecting anthocyanin synthesis in cress seedlings.
Biochem. J., 1951, **49**: 694-9, bibl. 19.

g Edelman, J., and Bacon, J. S. D.
The action of a hydrolytic enzyme system from *Helianthus tuberosus* L. on carbohydrates present in the tubers.
Biochem. J., 1951, **49**: 446-53, bibl. 24.

h FRIEDMAN, B. A.
Vacuum cooling of prepackaged spinach, cole slaw and mixed salad.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 279-87, bibl. 12.

i HANNA, G. C.
Asparagus plant breeding.
Calif. Agric., 1952, **6**: 1: 6, illus.

j HELM, J.
Vergleichende Betrachtungen über die Entwicklung der Infloreszenz bei *Lycopersicum esculentum* Mill. und bei einer Röntgenmutante. **(Comparative observations on the development of the inflorescence in *Lycopersicum esculentum* and an X-ray mutant.)**
Züchter, 1951, **21**: 89-95, bibl. 22, illus.
For abstract see *Plant Breeding Abstracts* 1951, **21**: 3097.

k HINGORANI, M. K.
Bacterial soft-rot of peas.
Curr. Sci., 1951, **20**: 191, bibl. 3.
Caused by a form of *Erwinia*.

l HOARE, A. H.
Market gardening in Britain.
Brit. agric. Bull., 1951, **4**: 164-7, illus.

m JACKS, H.
Compatibility of spray materials used in New Zealand on tomatoes.
Orchard. N.Z., 1951, **24**: 10: 17.

n JAIN, A. C.
A bacteria disease (canker) of tomatoes, new to India.
Sci. and Cult., 1951, **17**: 46-7, bibl. 6.
Caused by *Corynebacterium michiganense*.

o JAIN, A. C.
Pythium leaf-rot of lettuce.
Sci. and Cult., 1951, **17**: 258.
P. aphanidermatum recorded for the first time on lettuce.

p KENKARE, U. W., AND SOHONIE, K.
The "phenolase" from brinjal (*Solanum melongena*).
Curr. Sci., 1951, **20**: 268-9, bibl. 5.

q LAMM, R.
Försök med blomkål och tomat i kallhus. **(Cauliflower and tomato variety trials in the cold house.)** [English summary 23 lines.]
Medd. Trädgårdsförs. Malmö **69**, 1951, pp. 11, bibl. 11.

r MICHELBACHER, A. E., BACON, O. G., AND MIDDLEKAUFF, W. W.
Tomato insect control program.
Calif. Agric., 1952, **6**: 1: 7, 13, illus.
For northern California.

s MINISTRY OF AGRICULTURE, LONDON.
Cucumber mosaic.
Adv. Leafl. Minist. Agric. Lond. **340**, 1952, pp. 6, illus.

t PRIESTLEY, G.
Outdoor tomato trials at Lincoln.
N.Z. J. Agric., 1952, **84**: 39-40.

u ROSE, R. E., AND BAILEY, R. W.
Ethylene oxide for soil sterilization.
Nature, 1952, **169**: 716, bibl. 1.

v SCHOOREL, A. F., AND KUIZENGA, J.
Voorlopige mededeling over proeven betreffende de zaadteelt van sluitkool, zoals die op landbouwbedrijven geschiedt. **(Preliminary communication on experiments on the production of head cabbage for seed.)**
Gestencilde Meded. centr. Inst. landb. Onderz. **6**, 1951, pp. 9, from title in *Landbouwk. Tijdschr.*, 1951, **63**: 830.

w SINGH, B., AND GUPTA, V. C.
Diseases of spinach.
Curr. Sci., 1951, **20**: 104-5, bibl. 2.
Six diseases and their causal fungi recorded at Kanpur.

x SINGH, B., AND GUPTA, V. C.
An anthracnose disease of spinach.
Curr. Sci., 1951, **20**: 239-40, bibl. 5.
Caused by *Colletotrichum spinaciae*.

y SWIERSTRA, J.
New chemical treatments of seeds.
Zaadbelangen, 1951, **5**: 16-17, 33-4, from title in *Landbouwk. Tijdschr.*, 1951, **63**: 759.

z TOMETORP, G., AND HINTZE, S.
Klassificerande försök med vinterdill, bladkål och brysselkål 1948-1951. **(Variety trials with winter dill, kale and brussels sprouts 1948-1951.)** [English summary ½ p.]
Medd. Trädgårdsförs. Malmö **71**, 1951, pp. 13, bibl. 5.

2683.

a VEENBAAS, A.
The quality of garden peas in different stages of their development.
Tech. Ber. Peulvruchten Studiecombinatie **57**, 1951, pp. 27, from title in *Landbouwk. Tijdschr.*, 1951, **63**: 830.

b VEENBAAS, A., AND POLL, K. J.
The relation between the percentage of marsh spot and consumption quality in peas.
Tech. Ber. Peulvruchten Studiecombinatie **55**, 1950, pp. 15, from title in *Landbouwk. Tijdschr.*, 1951, **63**: 759.

c VENKATARAYAN, S. V., AND DELVI, M. H.
Black mould of onions in storage caused by *Aspergillus niger*.
Curr. Sci., 1951, **20**: 243-4, bibl. 5, illus.
First record of occurrence in India.

d VERHEY, C. W., AND WIERINGA, W.
Ultraviolet light as an aid to detect *Ascochyta* infection in pea seeds.
Zaadbelangen, 1950, **4**: 413, from title in *Landbouwk. Tijdschr.*, 1951, **63**: 351.

e WEBB, C. R. M.
Tomato culture in the Goulburn Valley.
J. Dep. Agric. Vict., 1952, **50**: 84-6, illus.

POTATOES.*

Breeding and varieties.

2684. Hagberth, N. O.
Potatissorterna i Sverige. **(Potato varieties in Sweden.)** [English summary 1½ pp.]
Växtodling **5**, 1951, pp. 192, bibl. 5, maps.
From all over Sweden 11,000 samples of potatoes, each comprising 20 tubers, were collected and grown at the Institute of Plant Husbandry of the Royal Agricultural College with the object of studying variety distribution and trueness to name. Although the majority of the 220 varieties identified are of little importance, it was satisfactory to record that the best table varieties are most widely grown. The paper ends with an alphabetical list of varietal names with their many synonyms and with notes on the areas where the varieties are grown.

2685. Monot, G.
Essais en Amérique du Sud. **([Potato variety] trials in South America.)**
Pomme de Terre franç., 1952, **15**: 152: 3-5.
In a preliminary trial in Argentina of numerous potato varieties imported from France, the following showed promise: Bonaton, Industrie, Ker Pondy, Vedette, Voran.

2686. Köhler, E., and Ross, H.
Das Verhalten deutscher Kartoffelsorten gegenüber verschiedenen Stämmen des X-Virus im Pfropfversuch. 1. Mitteilung. **(The reaction of German potato varieties to different strains of virus-X in grafting experiments. Report 1.)**
Züchter, 1951, **21**: 179-85, bibl. 23.
Data are presented showing the reaction of 53 potato varieties to 9 strains and 2 populations of virus-X, special attention being paid to hypersensitivity and its influence on resistance in the field.

2687. Howatt, J. L., and Hodgson, W. A.
Testing potatoes for resistance to late blight *Phytophthora infestans* (Mont.) De Bary.
Abstr. in *Proc. Canad. phytopath. Soc.* 1951, **18**: 11, from abstr. in *Rev. appl. mycol.* 1952, **31**: 77-8.
In work carried out in New Brunswick on the production of potato varieties resistant to *Phytophthora infestans*, *Solanum demissum* was hybridized with standard potato varieties and then back crossed with *S. tuberosum*. All seedlings were tested for resistance by inoculating whole plants in the greenhouse with a spore suspension, detached leaves of all surviving plants then being tested under controlled conditions. Of 91,000 seedlings so tested, ranging from completely immune to susceptible, a number are thought to be of some commercial value. No evidence has so far been obtained that *P. infestans* increases in virulence after serial passage from a susceptible plant through a series of increasingly resistant plants, or that biologic races of the fungus exist locally.

2688. Akeley, R. V., Lombard, P. M., and Stevenson, F. J.
Blight-resistant potato varieties can save copper and cut cost of production.
Amer. Potato J., 1952, **29**: 49-52, bibl. 1.
Trials in Maine have shown the late blight resistant potato variety Kennebec to yield satisfactorily without fungicide sprays. DDT sprays applied for insect control gave significant yield increases. The more extensive planting of this and other blight resistant varieties in the U.S.A. is urged.

2689. Lunden, A. P.
Undersøkelser over reaksjon mot kreft (*Synchytrium endobioticum*) hos potet. **(Investigations on the reaction of the potato to wart disease.)** [English summary 2¾ pp.]
Meld. norg. LandbrHøgsk., 1950, **30**: 1-48, bibl. 41, being *Meld. Åkervekstfors. norg. LandbrHøgsk.* **137** [received 1952].
The potato varieties tested for immunity to wart disease during the period 1939-46 are listed with annotations on how Norwegian results compare with those obtained in other countries. Another list, in which immune and susceptible varieties are grouped separately in alphabetical order, summarizes the results of tests carried out from 1916 to 1946. In the second part of the paper the inheritance of wart immunity is discussed in the light of the author's genetical studies.

2690. Ayers, G. W.
Verticillium wilt of potatoes.
From abstr. in *Phytopathology*, 1952, **42**: 25.
Notes on varietal susceptibility. Wilt is not common in Green Mountain and Katahdin, and the variety Houma is more resistant than any other variety now grown on a commercial scale.

2691. McLean, J. G.
Results of testing lines and varieties of potatoes for field resistance to verticillium wilt.
From abstr. in *Phytopathology*, 1952, **42**: 26.
In testing some 1,000 lines and varieties of potatoes in Idaho a strong correlation was found between lateness of variety and apparent resistance to verticillium wilt. The best sources of resistance were found in Katahdin and Seedling 41956 and their relatives, and in relatives of Jubel and other foreign varieties. The variety Populair has so far shown the greatest resistance.

2692. Montaldo, A.
Fitomejoramiento para resistencia a la nematosis de la papa. **(Selecting potatoes for resistance to *Heterodera marioni*.)** [English summary 1¼ p.]
Agric. téc. Chile, 1951, **11**: 64-85, bibl. 25, illus.
A survey was made of the distribution of potato eelworm disease (caused by *Heterodera marioni*) in the central and southern regions of Chile. It is considered that the most satisfactory remedy is the production and selection of resistant varieties. The results of trials carried out at the Centinela Potato Experimental

* As from 1953 Potatoes will be dealt with in Food Crop Abstracts, NOT Horticultural Abstracts.

Station, Puerto Octay, to determine the resistance of introduced and Chilean potato varieties and seedlings are reported. Out of 896 varieties and seedlings tested over a period of 5 years only 28 have shown resistance, and only 2, Royal Kidney and Seedling C77-1, have shown resistance in each of the 5 years. It appears that resistance is conditioned by recessive genes.

2693. STEINECK, O.
Förderung des Blühreichtums und der Fruchtbildung bei Kartoffeln. **(The promotion of flower and fruit formation in potatoes.)**
Bodenkultur, 1951, **5**: 449-58, bibl. 10, illus.

Increased fruiting of potatoes for breeding purposes was achieved (1) by growing plants grafted on tomato in the open—not in the glasshouse, which is too hot—and (2) by treating the flowers with 2,4-D.

2694. HAIGH, J. C.
A note on the viability of potato seeds.
Ann. Bot. Lond., 1952, **16**: 317-19, bibl. 1.

A series of germination tests was made on the reserve of potato seed over 9 years old accumulated by the Scottish Society for Research in Plant Breeding. Detailed tests were also made of the germination of seed during its first year of life. The tests show that some seed will germinate immediately the berry is ripe, but that full germination capacity is reached only 5-8 weeks after that time, and that this capacity is retained thereafter for about 13 years, after which it falls rapidly. Minor differences may result from the effect of parentage or method of storage. The time required for germination varied, though not widely, throughout the year, being shorter in the warmer months. It was shown that continued inbreeding has a deleterious effect on germination.

Seed potatoes and planting.

2695. DEPARTMENT OF AGRICULTURE FOR SCOTLAND.
Seed potatoes.
(*Publ.*) *Dep. Agric. Scot.*, 1952, pp. 107, illus., H.M. Stationery Office, 3s. 6d.

This comprehensive booklet describes methods whereby varieties may be identified and the procedure adopted in roguing. An alphabetical list of varieties with characteristics follows and an extensive, well-illustrated section is devoted to diseases and pests and their control with a table showing the reaction of potato varieties to viruses. Notes are given on storage and the use of sprout inhibitors.

2696. LUNDEN, A. P.
Forsøk med settepoteter fra forskjellig jordart. **(Trials with seed potatoes grown on different types of soil.)** [English summary 4½ pp.]
Meld. norg. LandbrHøgsk., 1950, **30**: 445-76, bibl. 16, being *Meld. Åkervekstfors. norg. LandbrHøgsk.* **140** [received 1952].

From trials carried out during the periods 1931-36 and 1942-46 the conclusion is drawn that the type of soil on which seed potatoes are grown has little influence on the yield of the succeeding crop. Experience in countries further south suggests the superiority of peat soils, but this is probably due to greater freedom from virus infection. Under Norwegian conditions, where the virus factor does not confuse the picture, peat did not show any special merit, except possibly for early potatoes.

2697. NORRIS, D. O.
Yield potential of potato tubers grown in different soils.
J. Aust. Inst. agric. Sci., 1951, **17**: 31-2.

A normally fertilized trial of comparable seed, from a uniform line of Factor (Up-to-Date) grown in 3 different soil types in the Canberra area, showed no direct effect of soil of origin on yield capacity of the seed grown in it.

2698. JEHLE, R. A., COX, C. E., AND MOORE, J. E.
Early home-grown seed for planting the late potato crop in Maryland.
Amer. Potato J., 1952, **29**: 1-7, bibl. 6.

A long-term investigation into the possibility of using seed from the early potato crop for planting the late crop showed that the most successful results were obtained with the varieties Marygold and Warba when the seed pieces were planted in cool moist sand. Results with Irish Cobbler were poor. Early sprouting was induced by soaking the cut seed pieces in a ¾% solution of ammonium thiocyanate for 5 minutes.

2699. KAMAT, M. N.
Simla seed-potatoes.
Poona agric. Coll. Mag., 1951, **41**: 285-7, bibl. 2.

The war caused a cessation of the importation of Italian seed potatoes and an intensification of the search for a good seed potato grown and bred in India. Large scale trials were made during 1939-43 with seed potatoes obtained from different parts of India and from Burma and Kenya. The Simla varieties Numbri and Phool proved to be best. They have replaced the Italian completely and are now grown very widely. Experience shows that potatoes grown at above 7,000 ft. are the best for seed purposes as they are free from fungal, bacterial and virus diseases.

2700. KAPOOR, S. L.
The role of type of seed in the culture of potato. II. Influence of number of eyes in a seed piece and size of seed tuber (whole) on growth, yield and grade of potato. III. Discussion of results.
Indian J. Hort., 1951, **8**: 2: 11-18, bibl. 7, illus., and **8**: 3: 6-8, bibl. 12.

Sets of Darjeeling Red Round potatoes each weighing 20 g. were prepared with 1, 2, 3, 4 or 5 eyes per set. Variation in the number of eyes had little effect on top growth or on the total weight of tubers produced, but sets with larger numbers of eyes produced significantly more and smaller tubers. Whole seed tubers weighing 5, 10, 20, 30 and 40 g. were also planted. Total yield and the number of tubers produced per plant increased but size of tubers decreased with increases in size of seed tuber. From these results and those reported earlier [see *H.A.*, 20: 2893] the author concludes that the larger the seed tubers or sets the better is the growth and yield of the crop, but that the quality of the crop is determined both by the

size of seed and the number of eyes. Two eyes in a seed piece are considered adequate.

2701. GOIDÀNICH, G.
Fenomeni di sterilità in patate da semina di provenienza olandese. **(Sterility in Dutch seed potatoes.)** [English summary ½ p.]
Boll. Staz. Pat. veg. Roma, 1949 (issued 1951), **7**: 67-83, bibl. 18, illus.

Three types of failure in Bintje potatoes of Dutch origin are described. In the first of these, prevalent in Sicily and in southern Italy, the buds developed short runners each ending in a small tuber a few centimetres in diameter. The second type, more frequent in the late sowings in the north was due to a rot of the seed-piece. In the last type, much less frequent than the others, long, thin sprouts produced very weak plants and lack of tubers, and the seed-piece was abnormally persistent. The first two cases are attributed to abnormal conditions affecting the parent plants, probably the serious drought of 1947 in northern Europe. The physiological state of the tubers, already abnormal, was also unfavourably influenced by the unusual weather conditions during storage and sprouting. The cause of the third type of failure is uncertain.

2702. STAPP, C.
Über den Wert von Azotobakter-Impfpräparaten für die deutsche Landwirtschaft. **(The value of azotobacter inoculum preparations for German agriculture.)**
Landw. Forsch., 1952, **3**: 176-205, bibl. 11.

While in three instances tuber inoculations did result in higher potato yields, the use of commercial azotobacter preparations in general agricultural production is not recommended.

2703. HEBBLETHWAITE, P.
"Savu" 2-row potato planter.
[*Publ.*] *Brit. Soc. Res. agric. Engng* **RT 43/50067**, 1950, pp. 19, illus.

The results of field tests with this simple potato planter attachment for a Fordson rear-mounted tool bar are reported, and recommendations made for its improvement.

2704. GODLEWSKI, K. J. M.
Potato planter "The Smallford three-row automatic potato planter".
[*Publ.*] *Brit. Soc. Res. agric. Engng* **RT 53/51035**, 1951, pp. 18, illus., 2s.

Specifications of the planter manufactured by Tractor Shafts Co. Ltd. are given and the results of tests under 3 soil conditions are reported. It is concluded that the machine is well and strongly constructed and offers a considerable saving in labour over hand-planting or over planting with less fully automatic machines. The spacing of the potatoes in the row is irregular but otherwise the type of work done is good.

Cultivation and nutrition.

(*See also* 2278, 2525, 3220, 3221.)

2705. BURAKOV, Y. M.
The use of peat for potatoes on sandy soils. [Russian.]
Sovet. Agron., 1951, No. 12, pp. 50-4, from abstr. in *Soils and Ferts*, 1952, **15**: 700.

Forty tons/ha. of previously dried peat is as effective in increasing yield in the western SSSR as half the normal amount of manure. The effect of peat and phosphate meal is enhanced by the application of manure and that of peat by the addition of PK fertilizers. Peat and phosphate meal are most effective when composted with manure. Peat with and without PK is very effective when ploughed in with green manure.

2706. VAN DER PAAUW, F.
Verhoging van de aardappelopbrengst door late overbemesting. **(Increasing the yield of potatoes by late application of fertilizers.)** [English summary ½ p.]
Landbouwk. Tijdschr., 1951, **63**: 234-42, bibl. 8.

The results of earlier experiments [*H.A.*, 19: 1331] indicated that in potatoes the ratio formation of dry matter/intake P_2O_5, which is constant over a long period, is fixed in the early stages of development and depends on the availability of phosphate. To determine whether plants adapted to low fertilizer conditions could be stimulated to higher productivity by a late application of fertilizers, 2 field trials were carried out on sandy soils. Considerable increases in yield were obtained by applying all or part of an N, P, K fertilizer about 3 weeks after emergence, at which time considerable differences were observable in the crops given different fertilizer treatment at planting time. The most successful treatment was the application of ⅓ of the fertilizer at planting time and ⅔ at a later date.—Agric. Res. Stat. and Soil Sci. Inst., Groningen.

2707. HENDRICKS, S. B., AND DEAN, L. A.
Use of P^{32} in measurement of fertilizer effectiveness under field conditions.
Trans. 4th int. Congr. Soil Sci., Amsterdam 1950, Vol. I, pp. 221-3, bibl. 5 [received 1952].

By the use of P^{32} radioactive isotope in field trials on the phosphate uptake of certain crops, including potatoes, it was shown that effectiveness of fertilization appears to depend upon adequate supply in the early stages of growth, that the maximum utilization of applied phosphate in the season does not exceed 30%, and that per cent utilization decreases with increased rate of fertilization and increased fertility level of the soil.

2708. JORDAN, J., AND OTHERS.
Uptake and movement of fertilizer phosphorus.
Soil Sci., 1952, **73**: 305-13, bibl. 12.

In experiments with potatoes band application provided more fertilizer phosphorus for plant use in the earliest stages of growth than did broadcast application. The potatoes took up more fertilizer and soil phosphorus at a low soil moisture tension than at a high tension. Plants were able to absorb more soil phosphorus from soil treated with superphosphate than from untreated soil. Tubers grown under low soil moisture tension conditions recovered only 6% of the fertilizer P as P_2O_5 when the fertilizer was applied in bands at 40 lb. per acre and 7% when the fertilizer

was broadcast at 40- and 80-lb. rates.—Idaho agric. Exp. Stat.

2709. Plant Pathology Division, Tasmanian Department of Agriculture.
Fire blight in potatoes.
Tasm. J. Agric., 1952, **23**: 29.
A disorder of potatoes which is widespread in Tasmania, and referred to as "fire blight", does not usually develop until flowering time when small purplish spots appear on the leaves. The affected spots rapidly die, turn brown and papery, and extend to involve the areas of the leaves between the veins and around the leaf margins. It is caused by a potash deficiency and is easily prevented by applying a dressing of a potassic fertilizer when the crop is sown. An application of 1 cwt. K_2SO_4 or KCl per acre is recommended. The tubers from fire blight crops are quite sound, though rather smaller than normal.

2710. Guha, M. P.
Boron deficiency and its relation to tuber cracking of potatoes.
Sci. and Cult., 1951, **17**: 40-2, bibl. 2, illus.
Cracking ranging from 1·7 to 50·7% in 26 varieties of potato grown at the West Bengal Agricultural Research Institute is attributed to the use of irrigation water containing 127·88 p.p.m. CaO on soil that already contains sufficient lime. It is suggested that the resultant excess of lime induced B deficiency.

Metabolism, growth and composition.

(*See also* 2767g, k.)

2711. Taylor, C. E.
Vegetative growth of the potato plant.
Nature, 1952, **169**: 399-40, bibl. 5.
Observations were made on potato varieties during 1950 and 1951 at Nottingham University on the establishment and development of aphid colonies in relation to the physiology of the potato leaf. Before the formation of axillary shoots the rate of increase in total leaf area was very nearly equal in all varieties; afterwards the main crop varieties Majestic, King Edward and Stormont Dawn continued to increase in leaf area, Arran Pilot reached peak size at an earlier date, while Ulster Chieftain reached it still earlier, but had a longer static period than the other varieties. It is thought probable that the potato plant exhibits a basic growth-form which is modified in each variety in a characteristic manner according to the stage in the growth cycle and the rate at which growth substances are distributed to the various organs. Some varieties use a high proportion of their metabolites for early tuber production, resulting in reduced top growth, while others, which form their tubers later, have a longer period of top growth.

2712. Meeuse, B. J. D., van der Eijk, A., and Latuasan, H. E.
Sucrose synthesis in higher plants and high energy phosphate.
Biochim. biophys. Acta, 1952, **8**: 478-9, bibl. 8.
Experiments with potatoes are described which offer an explanation of the fact that aerobic respiration is necessary for the synthesis of sucrose.

2713. Viirilä, P.
Päivän pituuden vaikutuksista meksikolaisen luonnonvaraisen perunan, *Solanum demissum* Lindl., biologiaan. (**The effect of day length on the biology of *Solanum demissum*.**) [English summary 23 lines.]
Arch. Soc. zool. bot. fenn. "Vanamo", 1949, **4**: 60-72, illus. [received 1952].
At Helsinki (latitude 60° 10′) *Solanum demissum* formed tubers only under short day conditions but did not flower, whereas the natural long day favoured vigorous vegetative growth and profuse flower formation. Marked differences between the growth of plants in a greenhouse and in the open were dependent mainly on dissimilarities in the quantity and especially the quality of light. The results of this research tend to confirm the theory that the flowering of *Solanum demissum*, as of *Solanum* species in general, is not dependent so much on a photoperiodic mechanism as on the quantity of light received.

2714. Coïc, Y., de Baissé, G., and Coppenet, M.
Évolution du manganèse dans les différents organes de la pomme de terre. (**The manganese content of different parts of the potato plant during their development.**)
Ann. agron. Sér. A., 1951, **2**: 31-46, bibl. 9.
The following conclusions are drawn from an investigation conducted at the plant physiological laboratory Versailles: (1) While the reserve materials disappear gradually from a seed potato tuber after planting out, its Mn content remains at a fairly constant level. (2) The young plant very soon absorbs Mn from the soil and in the early stages deposits most of it in the roots. Later the leaves have the highest Mn content, and this steadily increases during the growing season. (3) Compared with other nutrients, such as K and P, only a small quantity of Mn is translocated from the aerial parts to the young tubers. (4) The Mn content of the heel-end or the crown of the tuber is higher according to whether Mn supply is abundant or deficient. During sprouting the nutrient migrates from the medullary tissues to the cortical layers and from the heel-end to the crown and to the sprouts. The translocation of Mn to the sprouts is continuous, but after a considerable initial increase the Mn content of the sprouts stabilizes itself at a level 3-3½ times higher than that in the tuber. (5) Manuring has a marked influence on the Mn content of foliage and stem but little on that of the tuber. In soils where cereal crops show manganese deficiency symptoms but potatoes grow normally, the Mn content of the aerial parts is very low while that of the tuber is not affected. In a soil so low in Mn that deficiency symptoms appear in the potato leaf and the yield is reduced, the Mn content of the tubers is also very low, but it rises after dusting the foliage with manganese sulphate. (6) Mn deficiency does not induce hair sprout, but in affected tubers more Mn is translocated to the sprouts so that hair sprouts have a higher Mn content than healthy sprouts.

2715. Sparks, W. C.
The feeding habits of mice as correlated with the specific gravity of the stem and bud ends of potato tubers.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 288-90, bibl. 1, illus., being *Res. Pap. Idaho agric. Exp. Stat.* **332.**
The study reported suggests that there must be a concentration of some material in the stem end of potato tubers which can be readily detected by mice and rats. This substance is correlated with a relatively high specific gravity and high starch content.

2716. Goidànich, G., and Camici, L.
Ipotesi su un caso di metacromasia. Azione del violetto di genziana ammoniacale su elementi cellulari di meristemi cicatriziali nel tubero di patata. **(A case of metachromatism. The action of ammoniacal gentian violet on the wound-healing meristem in the potato tuber.)** [English summary 1 p.]
Boll. Staz. Pat. veg. Roma, 1948 (issued 1950), **6**: 31-44, illus.
It was found that ammoniacal gentian violet, used according to a modified Appel-Lison method, shows clearly the morphological and histochemical changes which take place in the cells in the first stages of differentiation of the wound-healing meristems in potato tubers. The method indicates that the wounded cells show a hitherto unknown metachromatic phenomenon. Some suggestions are made as to its nature, and the phenomena of wound gumming and suberization are discussed.

Virus diseases.

(*See also* 2532, 2752, 2754, 2767c, d, e, l.)

2717. Marini, E.
La frequenza del virus X e del virus dell' accartocciamento nelle patate d'importazione o riprodotte in Italia e in alcune razze italiane. **(Frequency of virus X and leaf roll virus in imported potatoes grown in Italy, and in some Italian varieties.)**
Not. Mal. Piante, 1951, No. 17, pp. 16-34.
Many named varieties were tested by different methods and the results are recorded.

2718. Norris, D. O., Mackay, J. H. E., and Keleny, G. P.
Symptom expression of potato leaf roll virus as influenced by soil conditions.
J. Aust. Inst. agric. Sci., 1951, **17**: 14-16, bibl. 4, illus.
Reports two striking examples of the effect of soil conditions on leaf roll expression which occurred in different varieties—Factor (Up-to-Date) and Katahdin on entirely different soil types. Field observations and tests by the phloroglucinol technique showed that, whilst secondary leaf roll is actually uniform throughout a crop from seed from one source, it is difficult to detect in the field in crops on rich soil making lush growth; in such crops, certification inspection therefore necessitates a close detailed examination of a portion of the crop or sample testing by the phloroglucinol technique. A.C.S.

2719. Keleny, G. P.
The detection of necrosis in leaf roll infected potato stems by means of fluorescence microscopy.
J. Aust. Inst. agric. Sci., 1951, **17**: 203-6, bibl. 6.
Experiments comparing the efficiency of the phloroglucinol and fluorescence tests indicated that the latter is much more sensitive; the possibility would appear to exist, however, that the latter technique may stain phloem elements altered by some means other than virus degeneration and thus may not always indicate true leaf roll infection. A.C.S.

2720. Norris, D. O.
Spotted wilt of potato. I. The field disease and studies of the causal virus.
Aust. J. agric. Res., 1951, **2**: 221-42, bibl. 12, illus.
The results of field and greenhouse studies of the symptomatology of the naturally occurring disease on potatoes are presented together with an analysis of 5 purified virus strains involved in spotted wilt. The existence of two types of spotted wilt virus differing in their strain components is demonstrated; the " tip blight " strain is shown to be absent from the virus affecting potato in the field which thus differs from the type commonly occurring in tomatoes. A.C.S.

2721. Norris, D. O.
Spotted wilt of potato. II. Tuber transmission and vector studies of the field disease.
Aust. J. agric. Res., 1951, **2**: 243-60, bibl. 11.
This paper discusses aspects of tuber transmission of the virus and reports studies of the thrips population associated with potatoes in the 1947-49 seasons. Investigations showed that 30-40% of tubers from diseased plants transmit the disease; because of discontinuous distribution of virus in the tubers, it is not transmitted to the resultant plant from all infected tubers; normal looking tubers from diseased plants showed an even higher rate of transmission than those showing distortion or terminal cracking; culling cracked tubers from seed therefore only reduces the carry-over of disease. Second-generation diseased tubers gave rise to approximately the same amount of tuber transmission as first-generation; nearly half the plants infected at emergence survived throughout the growing period, showing that such plants could serve as a source of infection by thrips vectors, principally *Thrips tabaci* Lind. Spotted wilt, whilst world-wide in distribution, only causes trouble in potatoes in eastern Australia where epidemics occur in some seasons; this is apparently due to a suitable combination of 3 factors, viz.: susceptible variety, succulent growth coinciding with the maximum activity of the thrips vector, and seasonal conditions allowing early and intensive thrips breeding. Whilst with susceptible varieties little can be done about an epidemic outbreak, certain measures are discussed which would reduce loss from a second epidemic season. A.C.S.

Fungous and bacterial diseases.

(*See also* 2767h, i, j, n.)

2722. GREGG, M.
Studies in the physiology of parasitism. XVII. Enzyme secretion by strains of *Bacterium carotovorum* and other pathogens in relation to parasitic vigour.
Ann. Bot. Lond., 1952, **16**: 235-50, bibl. 11.

When tested on potato tubers and roots of turnip, swede, and carrot the organisms *Bacterium aroideae*, *B. carotovorum* (i), *B. carotovorum* (ii), and *Phytomonas carotae* show diminishing pathogenicity in the order named. Attack on potato is greatest at 25-35° C., and falls off gradually from 20° to 10°, below which it ceases. The susceptibility of potato tubers rises as they grow to full size but falls during the dormant period. With the active parasite *B. aroideae* there is a considerable rise in susceptibility as the tuber reaches the stage of sprouting. Susceptibility of potato tubers is increased by storage for some time at an elevated temperature (*c.* 35° C.), or by raising their water-content, either by soaking or by direct injection, and especially by the latter. Similar responses to these treatments are given by enzymic preparations of the bacteria. The greater pathogenicity of *B. aroideae* than of the *carotovorum* strains is associated with a greater rate of multiplication of the former under comparable conditions and with a greater tendency of the latter to an acid-forming type of metabolism which is unfavourable to multiplication of the organism and to the activity of its enzyme. [Authors' abstract.] —Imp. Coll. Sci. Technol. Lond.

2723. LANE, G. H.
Studies of dry fungicides on cut potato seed pieces.
From abstr. in *Phytopathology*, 1952, 42: 25.

Cut potato seed pieces treated with a number of organic and inorganic fungicides were planted in soil infested with fusaria in the greenhouse. Thiram and zineb at low concentrations showed no detectable deleterious effect on the seed and were outstanding in reducing fungal infection. Under field conditions these materials reduced rot, improved stands and increased yields significantly when compared with the results from untreated cut seed.

2724. YOUNG, R. A., AND MILBRATH, J. A.
Control of potato seed-piece decay by seed piece treatment.
From abstr. in *Phytopathology*, 1952, 42: 26.

Seed-piece treatment with Semesan Bel, Phygon, and Ziram resulted in reduced seed-piece decay, a reduction in the incidence of black-leg and rhizoctonia, and increased stand and yield.

2725. MOOI, J. C.
Het fusarium-rot of droogrot bij aardappelen. **(Fusarium rot or dry rot of potatoes.)**
Landbouwk. Tijdschr., 1950, **62**: 712-24, illus. [received 1952].

The symptoms of fusarium rot are described and the factors affecting its development are reviewed. Trials in Holland have shown that treatment of the stored tubers with Fusarex will give considerable but not complete control. The treatment is recommended for use with Bintje, provided tubers intended for seed are presprouted, but no definite recommendations can yet be made for other varieties. Other control measures mentioned are the avoidance of mechanical injury to the tubers during harvesting and handling, and the breeding of resistant varieties. *Solanum demissum* crosses have shown a high degree of resistance.

2726. PETTINARI, C.
Azione patogena della *Clonostachys araucariae* Corda var. *rosea* Preuss su tuberi di *Solanum tuberosum*. **(The pathogenic action of *Clonostachys araucariae*, var. *rosea* on potato tubers.)** [English summary 3½ lines.]
Boll. Staz. Pat. veg. Roma, 1949 (issued 1951), **7**: 85-92, bibl. 12, illus.

The morphology and biometry of *Clonostachys araucariae* var. *rosea* and the development of infection on potato tubers is described.

2727. WENZL, H.
"Blattdürre" der Kartoffel als Erscheinungsform der Colletotrichum-Welkekrankheit (Vorläufige Mitteilung). **(Leaf scorch of potato as a symptom of colletotrichum-wilt disease. Preliminary communication.)**
PflSch. Ber. Wien, 1952, **8**: 11-14, bibl. 2.

The relationship between leaf scorch and colletotrichum wilt disease is regarded as being confirmed by the occurrence, in wilt disease infested districts, of tubers with both adherent stolons and spindle sprouts.

2728. ANDRÉN, F.
Besprutningsförsök mot potatisbladmögel 1950. **(Spraying trials against potato blight 1950.)**
Växtskyddsnotiser, 1951, No. 2-3, pp. 33-6, illus.

In the 1950-trials carried out at Nickelby and Åkarp fungicidal applications resulted in an average yield increase of 19% over the controls. Bordeaux mixture again gave the best blight control, but the highest yields, 35,000 kg./ha., were recorded from plots treated with 0·5% Cuproil, a copper-oil emulsion, as against 29,000 kg. after bordeaux.

2729. POST, J. J., AND RICHEL, C.
De mogelijkheden tot reorganisatie van de waarschuwingsdienst voor aardappelziekte. **(Possibilities for the reorganization of the Dutch potato-blight warning service.)** [English summary 1 p.]
Landbouwk. Tijdschr., 1951, **63**: 77-95, bibl. 19, maps.

Recent investigations in Holland have shown that potato blight breaks out generally after 2 consecutive days with a mean relative humidity of 82% or more, the mean being taken from observations at 8 a.m., 2 p.m. and 7 p.m., when on at least one of these days the minimum temperature is 10° C. or more. Further investigations revealed that blight would still develop when the relative humidity on one of the two days descended to 79%. The value is discussed of using these data as a basis for blight warnings rather than the data previously used.—Kon. ned. meteor. Inst.

2730. Vanderwalle, R.
Sur un cas d'attaque de gale poudreuse. **(An attack of powdery scab of potatoes.)**
Parasitica, 1952, **18**: 15-16, bibl. 1, illus.

Spongospora subterranea, the cause of powdery scab of potato, though rather widely distributed in Belgium does not cause serious loss. The general symptoms of the disease are mentioned and it is noted that in 1951 series of nodules caused by this fungus were found on the small roots of certain interspecific hybrids of *Solanum* grown on the Research Station for Potato Improvement at Libramont.—State Phytopathology Station, Gembloux.

2731. Hooker, W. J., and Sass, J. E.
Histological aspects of potato stem necrosis incited by *Streptomyces scabies*.
Amer. J. Bot., 1952, **39**: 15-19, bibl. 5, illus., being *J. Pap. Ia agric. Exp. Stat.* **J-1930.**

Studies of the pathological histology of *Streptomyces scabies* [the common scab organism] have been made on potato stems under greenhouse and field conditions. In the greenhouse, lesions were generally deep and necrosis was advanced on the stems of varieties susceptible to tuber scab. Intracellular filaments were usually abundant. Periderm was either lacking or poorly defined. Lesions on stems of resistant varieties were usually shallow. Filaments in many lesions were sparse and a well defined periderm layer was generally present below the lesion. Natural openings in the stem, associated with adventitious roots, apparently served as infection courts in resistant and susceptible varieties. Varietal resistance was generally not manifest in lesions near such roots. Moreover, under field conditions there were no well defined differences in the histology of lesions on resistant and susceptible varieties. [Authors' summary.] [For a preliminary account of this work see *H.A.*, 18: 1219.]

2732. Hey, A.
Untersuchungen über die Anfälligkeit von Kartoffelsorten gegen den Krebsbiotyp G. **(Investigations on the susceptibility of potato varieties to *Synchytrium endobioticum*, race G.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1951, **5**: 226-30, bibl. 1.

From extensive tests repeated for several years 18 potato varieties were proved completely resistant to wart disease caused by the G type of the fungus.

Nematodes.

(*See also* 2767m.)

2733. Bernard, J.
Recherches sur les plantes-hôtes de *Ditylenchus dipsaci* Kühn provenant de betteraves fourragères. **(An investigation on the plant hosts of *Ditylenchus dipsaci* found on mangolds.)** [Summaries in Dutch, English and German.]
Parasitica, 1952, **8**: 28-39, bibl. 5, illus.

Tests showed that the *Ditylenchus dipsaci* strain found on mangolds in Brabant, Belgium, may attack rye, peas, onions and potatoes, all of which are very sensitive to this eelworm.—State Entomological Station at Gembloux.

2734. Wenzl, H.
Zum Auftreten des Kartoffel-Wurzelälchens (*Heterodera rostochiensis* Wollenw.) in Österreich. **(Incidence of the potato root eelworm, *Heterodera rostochiensis*, in Austria.)**
PflSch. Ber. Wien, 1951, **7**: 161, bibl. 1.

Only where no crop rotation is practised do the nematodes do any serious damage.

2735. Mai, W. F.
Temperature in relation to retention of viability of encysted larvae of the golden nematode of potato, *Heterodera rostochiensis* Wollenweber.
From abstr. in *Phytopathology*, 1952, **42**: 113.

Survival of encysted larvae in moist soil for a 6-month period at 6 temperatures, ranging from 3° to 37° C. decreased as the temperature increased, but, with the exception of a higher mortality at 37° C., the storage temperature had very little effect upon the retention of viability of air-dried encysted larvae. The average monthly soil temperatures at a depth of 6 in. were, for Long Island, New York, from 1° to 23° C. with an average of 9°, and for Leesburg, Florida, from 21° to 30° C. with an average of 26° C. Nematode survival was favoured by the lower New York temperatures.

2736. Feldmesser, J., Fassuliotis, G., and Spruyt, F. J.
Investigations on control of the golden nematode of potatoes.
Plant Dis. Reptr, 1951, **35**: 515-18, bibl. 4.

The golden nematode of potatoes, *Heterodera rostochiensis*, is, at present, confined to only one area of the United States, namely, the two countries comprising Long Island, N.Y. Reference is here made to quarantine regulations designed to prevent the distribution of lily-of-the-valley pips imported from Europe with nematode cysts adhering to their roots. In tests against cysts from infested soil the following treatments were found to be lethal to their contents: 1. Dowicide 2, 1 : 2,000 parts, for 4 min. at 60° F. 2. 0·5% formalin for 10 min. at 85° F. 3. Methyl bromide, 11 lb. per 1,000 cu. ft. for 8 hr. at atmospheric pressure. 4. Hot water at 112° F. for 3 hr., 114° F. for 2 hr., 116° F. for 55 min., 118° F. for 30 min., 120° F. for 30 min., and 125° F. for 10 min. In some sublethal treatments with both hot water and chemicals, more larvae survived in winter cysts than in summer cysts.—Department of Agriculture, Hicksville, New York.

2737. Staniland, L. N., and Stone, L. E. W.
"Solubilized" chemicals for the control of plant nematodes.
Nature, 1952, **169**: 420, bibl. 2.

It was found that the value of chlorphenol and other chemicals of like nature as nematicides is greatly enhanced by preparing them in a "solubilized" form by the use of detergents of the long-chain alkyl sulphate type. The chemicals so prepared not only penetrated the cysts of potato eelworm, *Heterodera rostochiensis*, in the soil, but also the egg-shells within the cysts, killing the enclosed larvae.

Mite and insect pests.

2738. Stelzner, G.
Schädigung von Kartoffelpflanzen und anderen Solanaceen durch die Milbe *Avrosia translucens* Nietner. **(Damage to potatoes and other solanaceous plants by the mite, *Avrosia translucens*).**
Z. PflKrankh., 1951, **58**: 412-16, bibl. 8, illus.

Potato plants grown in greenhouses showed a disease characterized by glossiness, browning and dropping of the leaves, accompanied by deformations. The disorder is caused by a mite, *Avrosia translucens*, which is able also to infest a number of other plant species. It can be controlled by Erysit, a preparation containing colloidal sulphur, as a 1% solution applied twice weekly to protect the young growth. Wettable sulphur is also effective.

2739. Seiffert, M.
Über eine epidemische Blattdürre der Kartoffel (Erreger *Tetranychus althaeae* v. Hanstein). **(An epidemic leaf-scorch of potato caused by *Tetranychus althaeae*.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1951, **5**: 189-93, bibl. 6, illus.

The death of potato plants in the vicinity of clover crops in Thuringen was traced to the mite *Tetranychus althaeae* which had overwintered in the clover and migrated to the potatoes in spring, especially during warm dry weather in May. The attack of the mite produces black necrotic spots, initially on the underside of the leaf, but spreading until the whole leaf and finally the plant itself is killed. Early cutting and carting of the clover is recommended as a preventive measure, and laboratory trials indicated that control could be obtained with 2% lime sulphur and 1% Polybar. *Tetranychus althaeae* has not previously been listed as a potato pest; and "potato acarosis" is suggested as a name for this phenomenon.

2740. May, A. W. S.
Potato tuber moth control in south Queensland.
Qd agric. J., 1951, **73**: 213-14.

The seasonal history of *Gnorimoschema operculella* is outlined and control measures are recommended. DDT, as spray or dust at 1 lb. per acre, should be applied in the pre-flowering and post-flowering stages to prevent larval damage to the tops. The plants should be hilled after most of the tubers are formed, but before they have developed sufficiently to crack the soil. As the tubers are bagged in the field they should be treated with a 2% DDT dust at the rate of $\frac{1}{2}$ lb. per bag, and stored potatoes should be thoroughly treated at the same rate.

2741. Entomological Branch, Department of Agriculture, N.S.W.
The potato moth (*Gnorimoschema operculella*).
Agric. Gaz. N.S.W., 1951, **62**: 664-7, illus.

The potato moth is prevalent in New South Wales and its larvae may cause considerable damage to foliage and stems in early summer. The pest is described and its life-cycle outlined. Almost complete control can be obtained by spraying or dusting with DDT. The spray is used at 0·1% and 100 to 120 gal. of spray used per acre. If dust is used 50 lb. of a 2% or 20 lb. of a 5% dust are required per acre. A great reduction in tuber infestation can also be obtained by thorough earthing up fairly late in the season. When earthing up cannot be done satisfactorily, deep planting, to a depth of at least six inches will reduce loss of tubers. It is considered undesirable to grow potatoes on the same land two years running. Table potatoes may be protected from infestation by dusting them thoroughly with derris. Infested table potatoes may be fumigated with carbon bisulphide, in an airtight container, using 2 lb. of carbon bisulphide (24 fl. oz.) per 1,000 cu. ft. of air space.

2742. Caltagirone Z., L.
Observaciones sobre *Arrenoclavus koehleri* (Blanchard). **(Observations on *Arrenoclavus koehleri* (Blanchard).)** [English summary $\frac{1}{3}$ p.]
Agric. téc. Chile, 1951, **11**: 20-34, bibl. 18, illus.

A hymenopterous polyembryonic parasite of the potato tuber moth (*Gnorimoschema operculella*). Mass production, which is an easy and economic process, is described in detail.

2743. Beran, F.
Auftreten und Bekämpfung des Kartoffelkäfers in Österreich im Jahre 1951. **(Incidence and control of colorado beetle in Austria in 1951.)**
PflSch. Ber. Wien, 1952, **8**: 50-8.

The infested area for the whole of Austria increased from 9·7% in 1950 to 12·2% in 1951, though the intensity of the attack was generally mild, and the prompt employment of control measures was uniformly successful.

2744. Picco, D.
Esperienze di lotta contro la dorifora della patata (*Chrysomela decemlineata* Say) effettuate durante l'anno 1951. **(Control of the colorado beetle in 1951.)**
Not. Mal. Piante, 1951, No. 17, pp. 46-52.

The best results were obtained with lindane alone and with lindane plus chlordane and DDT.

2745. Schwartz, E.
Nachwirkungen einer insektiziden Behandlung bei Vollinsekten des Kartoffelkäfers. **(After effects of insecticidal treatment on adult colorado beetles.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1951, **5**: 185-9, bibl. 8.

Mortality among adult colorado beetles treated with DDT, BHC and Spritzarcal was highest during the first month following treatment, declining to insignificance at the end of the summer. The following season the mortality rate was observed to be higher among the survivors than the control insects, although oviposition did not appear to be affected by treatment. These survivors were also found to be as susceptible to further treatment as the controls, and both were less tolerant of the insecticides than young adults.

2746. Mallo, R. C.
Nota sobre un insecto minador de las hojas de la papa (*Diptera agromyzidae*). **(Note on a leaf miner of potato.)**
Idia, 1951, **4**: 48: 3, illus.
A dipterous leaf miner, possibly a *Liriomyza* species, has been observed on potatoes under glass and in the open in Tucuman, Argentina. The insect and the damage caused are described. The adult fly can be killed by chlorinated insecticides. The larvae were controlled by the systemic insecticide No. 1059 (an ester of diethyl dithiophosphoric acid).

2747. Bradley, R. H. E., and Ganong, R. Y.
Aphid infestations on Katahdin and on a seedling resistant to *Myzus persicae* (Sulz.) with two dates of planting.
Canad. J. Zool., 1951, **29**: 329-38, bibl. 5.
Katahdin was used as a standard for comparing the aphid infestations of other varieties and of potato seedlings. In August under field conditions, on early planted plots the number of *Myzus persicae* per plant was usually over five times as great on Katahdin as on the seedling B294-85, and the number of *Aphis abbreviata* over 10 times as great. Differences between the aphid populations of late planted plots were similar but not so great. There were no consistent differences in the numbers of *Macrosiphum solanifolii* on Katahdin and on B294-85.—Field Crop Insect Lab., Fredericton, N.B.

2748. Lal, R.
Biology and control of *Myzus persicae* Sulzer as a pest of potato at Delhi.
Indian J. agric. Sci., 1950 (issued 1951), **20**: 87-100, bibl. 24.
The life-history and seasonal incidence on potato of *Myzus persicae* at Delhi have been worked out and are described. DDT spray emulsions at 0·125 to 0·5% and DDT dusts at 2·5 to 10% gave complete kill within 2 to 4 days without showing any phytocidal action on potato plants.

2749. Rönnebeck, W.
Weitere Beiträge zur Bekämpfung von *Myzodes persicae* Sulzer als Virusüberträger im Kartoffelfeld. **(Further information on the control of *Myzodes persicae* Sulzer as virus vector in potato fields.)** [English summary ½ p.]
Z. PflKrankh., 1952, **59**: 13-26, bibl. 19.
Phenological data are given regarding the main flight period of the migrant form of *Myzodes persicae*. There is no fundamental difference between the conditions in Germany and those described for Maine (U.S.A.) as regards the spring development of *M. persicae* on the primary host. It is estimated that the part the secondary hosts play relative to the total number of spring migrants is negligible. Secondary hosts as sources of alatae are important only for fields in the immediate neighbourhood. The intensity of the flight from peach trees is a decisive factor for the infestation of potatoes. The control of *M. persicae* can best be effected with a systemic aphicide, Systox, at 0·5 litres per hectare, applied twice.

2750. Wallis, R. L.
Cull-potato piles as breeding places for the potato psyllid and tuber flea beetle.
Amer. Potato J., 1952, **29**: 17-22, bibl. 2.
An account is given of experiments made by the U.S. Department of Agriculture in Nebraska to determine the extent of breeding of potato psyllid, *Paratrioza cockerelli* and tuber flea beetle, *Epitrix tuberis* on potato cull piles, and to devise efficient methods of eliminating them. The easiest and most effective method of control was spreading the tubers in a single layer on the soil to be killed by exposure to weather. The dried culls can be used for cattle fodder.

Haulm destruction.

(*See also* 2767a.)

2751. Large, E. C. (compiled by).
Trials of substitutes for sulphuric acid for potato haulm killing.
Plant Path., 1952, **1**: 2-9, bibl. 1, illus.
In co-operative trials during 1951 at 11 centres in England and Wales with 5 spray materials the best kill of leaves and stems was obtained with sulphuric acid applied either by high or low volume sprayers, followed by tar oil fraction (TOF 54), low volume, and sodium arsenite, high volume. Tar acid emulsion (TAC 49), high volume, and sodium chlorate, high volume, were less effective. Observations on weed control showed the effect of the treatments to be of the same order as that of their kill of potato haulms. Four machines were compared in trials of mechanical haulm destruction, horizontal haulm cutters, rotary-cultivator cutters, rotary rubber flails and rotary hammer pulverizers. All effectively cut or pulverized the greater part of the haulm at slower speeds than, but at only about half the cost of, acid spraying. Under moist, dull conditions prevailing in 1951, however, the haulm debris dried only slowly and where blight was present the fungus continued to sporulate actively for at least a fortnight after the operation.

2752. Cunningham, C. E., Eastman, P. J., and Goven, M.
Potato vine killing methods as related to rate of kill, vascular discoloration, and virus disease spread.
Amer. Potato J., 1952, **29**: 8-16, bibl. 16, illus.
Work on mechanical and chemical methods of haulm destruction is reported from the Maine Agricultural Experiment Station. In all varieties the haulm was killed more readily when matured, and of the chemicals used dinitros and tar acids were the most rapid. The greatest amount of discoloration of the tubers occurred in the early varieties, and those materials that killed the vines most rapidly tended to produce the greatest amount of vascular discoloration. No alteration in discoloration on storage was noticed. A combination of rotobeating and chemical spraying was the most effective means of reducing the spread of leaf roll virus.

Harvesting and marketing.

(*See also* 2767b.)

2753. GREEN, H. C.
Methods of harvesting potatoes. A preliminary study.
[*Publ.*] *Brit. Soc. Res. agric. Engng* **C.S.13-1084**, 1952, pp. 35, 3s.

A study was carried out in 1948 to determine details of the requirements in men and machinery for different methods of harvesting potatoes on the fen and silt soils of East Anglia. The methods ranged from the use of the more elaborate harvesters to elevator diggers, spinners, and a horse drawn potato plough. The results showed that the shortage of skilled labour for harvesting potatoes may be overcome by the use of suitable machinery. The rate of working output per man and running cost are more dependent on the skill of the team than on the type of machine used, although the type of machine can help considerably to lighten the work of the pickers.

2754. FOLSOM, D., AND OTHERS.
Effect of railroad transit conditions on certain potato tuber diseases.
From abstr. in *Phytopathology*, 1952, **42**: 112.

In a transit period of about 1 week with a mean car temperature during shipment of 43° to 50° F., leafroll net necrosis and stem-end browning (virus) usually increased in severity; mahogany browning and bacterial ring rot increased in prevalence and severity; late blight rot did not increase after mid-November, but bacterial soft-rot and fusarium rot associated with late blight did increase.

Tainting by insecticides.

2755. DETROUX, L.
La désinsectisation du sol et la transmission d'une saveur désagréable aux cultures de pommes de terre. **(The disinfestation of the soil and the transmission of a disagreeable flavour to potatoes.)**
Parasitica, 1952, **8**: 40-3.

The trials described indicate that preparations of lindane (γ-isomer of HCH) of German origin, of aldrin, toxaphene, and parathion, do not transmit a disagreeable flavour to crops of potatoes planted on soils treated and sprayed with those products. It is desirable, however, to avoid using preparations of chlordane, dieldrin or lindane not obtained from the sources mentioned above or products based on purified HCH which no longer emits the characteristic musty odour.—State Station of Plant Protection, Gembloux.

2756. JAMESON, H. R., AND PEACOCK, F. C.
The persistence of crude benzene hexachloride in the soil.
J. Sci. Food Agric., 1952, **3**: 78-82, bibl. 6.

It is shown that the residual BHC, determined analytically in a loam soil, is a function of the amount of BHC (13% γ-isomer) (BHC-13) applied per acre and the time elapsing after application. A significant correlation was found between the level of residual BHC and degree of tainting of potatoes grown in the same soil. BHC-13 thoroughly worked into the top 6 in. of a loam soil, at rates up to 8 lb. per acre, was lost at an exponential rate of approximately 50% per annum over the period of the trial [3 years]. Provided that the application of BHC-13 to the soil does not exceed $\frac{1}{2}$ lb./acre annually, the risk of growing tainted potatoes on loam soil in England seems slight; surface application at higher rates may also be safe. [From authors' synopsis.]

Storage and sprout inhibition.

2757. DE JONG, W. H., AND HOFSTRA, D.
Ervaringen met aardappelbewaring in gebouwen en in kuilen in het seizoen 1949-1950. **(Potato storage experiments in buildings and pits during the 1949-50 season.)**
Landbouwk. Tijdschr., 1950, **62**: 680-96, illus. [received 1952].

A series of experiments is described on the bulk storage of potatoes, for seed and consumption, in air-cooled, heat-insulated sheds, cold stores, and pits with or without Fusarex treatment. Detailed results are reported. Eersteling and Bintje tubers intended for seed kept as well in the air cooled sheds as in cold store at 2° C. Pit-stored tubers treated with Fusarex kept well but germinated slowly and irregularly, whereas untreated pit-stored tubers did not keep well. Tubers brought into the air-cooled store early (end of August) gave better results than those brought in late (beginning of November). Eigenheimer tubers intended for consumption were in better condition on 15 March after storage in air-cooled sheds and Fusarex-treated pits than after storage in untreated pits, and the vitamin-C content was higher. Some problems of storage in air-cooled sheds are discussed.

2758. VAN BRUGGEN, O.
De bouw en inrichting van door buitenlucht gekoelde aardappelbewaarplaatsen. **(The construction and design of air-cooled potato stores.)**
Landbouwk. Tijdschr., 1950, **62**: 697-711, bibl. 1 [received 1952].

Detailed directions and diagrams are given for the construction of the types of potato store cooled by mechanically controlled, forced ventilation from the outside air. Cold air is forced either under a slatted floor or through channels made in the floor. Design and building materials, including insulating materials, are discussed.

2759. DE JONG, W. H., HOFSTRA, D., AND OUDE OPHUIS, B. G.
Verdere gegevens over gestorte bewaring van aardappelen met buitenluchtkoeling in gebouwen, naast opslag in kuilen. **(Further data on the bulk storage of potatoes in buildings cooled by forced draught and in clamps.)** [English summary $\frac{3}{4}$ p.]
Landbouwk. Tijdschr., 1951, **63**: 485-508, bibl. 3, illus.

The results are given of experiments in the storage of seed and ware potatoes in insulated buildings cooled with forced draught, in clamps ventilated with forced

draught, clamps treated with sprout inhibiting substances and ordinary clamps. In all cases the potatoes stored in the buildings and in the ventilated clamps kept better than those stored in ordinary clamps.

2760. Oude Ophuis, B. G.
De temperatuur in luchtgekoelde ruimten en in kuilen. (Temperature in potato stores cooled by forced draught and in clamps.) [English summary 1 p.]
Landbouwk. Tijdschr., 1951, **63**: 509-22, illus.

In an introductory section the principle of air-cooling is discussed and a diagram is given to show a cross-section of an air-cooled potato store. The author then considers the amount of insulation needed to prevent both frost damage and the warming up of potatoes in periods of comparative high outside temperatures; the quantity of air required for cooling; the air distribution in the store; and the control of ventilation. The average temperature in an air-cooled shed, an air-cooled clamp and a normal clamp are graphically compared. It is shown how the temperatures in the air-cooled shed can be predicted for the different months of the year.

2761. Heinze, P. H., and others.
Variations in specific gravity of potatoes.
Amer. Potato J., 1952, **29**: 31-7, bibl. 8.

Some thousands of tubers of 6 potato varieties from 10 states were individually tested for specific gravity at Beltsville, Md. Katahdin showed the greatest variability, Irish Cobbler and Chippewa the least. The relative humidity of storage rooms proved an important factor influencing changes in specific gravity during storage; a humidity of 90% resulted in slight change but lower humidities caused noticeable changes. Marked varietal differences were observed in shrinkage and changes in specific gravity during storage.

2762. Naka, J.
Physiological and ecological studies on potato plants. Part I. Especially on the tuberization of the sprout on potato tuber. [Japanese with English summary ½ p.]
Tech. Bull. Kagawa agric. Coll., 1950, **1**: 3: 36-41.

From a study of stored potatoes of the variety Beni-Maru it is concluded that the mechanism by which tubers sometimes develop directly on the sprouts is similar to that of secondary tuber formation on seed potatoes in the field. Under dark, damp conditions there is an accumulation of starch in the sprouts, arising from an abundant supply of sugars from the parent tuber.

2763. Kruyt, W., and Veldstra, H.
Potato sprout inhibition by α-(alkoxymethyl-) naphthalenes. Researches on plant growth regulators XVIII.
Landbouwk. Tijdschr., 1951, **63**: 398-403, bibl. 28.

In laboratory scale trials the effect of a series of α-(alkoxymethyl-) naphthalenes on the sprouting of potato tubers was determined and compared with that of methyl α-naphthylacetate and of 2,3,5,6-tetrachloronitrobenzene. In quantities of 0·015 and 0·030 g. of the compound per kg. of tubers, the naphthylacetic acid ester proved to be the most active compound; with 0·060 g. per kg. α-(ethoxymethyl-) naphthalene has the strongest inhibitory effect. With the last mentioned quantity the tetra-chloronitrobenzene and α-(methoxymethyl-) naphthalene are also more active than the ester. With lengthening of the chain of the alkyl group, the activity decreases, so that n- and tert. (butoxymethyl-)naphthalene practically have no effect while (isoamyloxy-) and (cyclohexyloxy-)naphthalene even seem to favour sprouting. The inhibitory effects of the compounds were compared with their condensing actions on the oleate coacervate (a model-system for protoplasmic membranes) and it was found possible to use the action of different types of compounds on this model-system as a method for pre-selection of material to be tested for inhibitory activity on potato sprouting. [From authors' summary.]

2764. Downie, W. A.
Maintenance of quality in stored table potatoes.
J. Dep. Agric. Vict., 1952, **50**: 61-6, 76, illus.

Iso-propyl phenyl carbamate (IPPC), as a 2% dust at the rate of 3 lb. per ton of potatoes, kept all varieties tested completely free from sprouts for 5 months and tuber weight losses to a minimum, with no impairment of appearance or cooking quality. It is not toxic and does not impart any undesirable characteristics to potatoes. The tubers should be treated as soon as possible after harvest. When applied there should be sufficient agitation to ensure that each potato receives a quota of dust. Among other substances tested a nitrobenzene preparation was the only one really effective and that acted efficiently only on the Snowflake variety.

2765. Paterson, D. R., and others.
The effect of preharvest foliar sprays of maleic hydrazide on sprout inhibition and storage quality of potatoes.
Plant Physiol., 1952, **27**: 135-42, bibl. 21, illus., being *J. Art. Mich. agric. Exp. Stat.* **1270.**

Sprays of 500, 1,000, and 2,500 p.p.m. of maleic hydrazide applied to the foliage of Irish Cobbler and Pontiac potato vines approximately one to seven weeks before harvest were effective in prolonging dormancy of tubers held in storage for seven months at temperatures of 45 and 55° F. The inhibition of sprouting resulting from single preharvest foliar sprays of 2,500 p.p.m. of maleic hydrazide applied four to seven weeks before harvest was more complete than that obtained with preharvest foliar treatments of 2,4,5-trichlorophenoxyacetic acid or with post-harvest applications of the methyl ester of alpha-naphthaleneacetic acid. Maleic hydrazide-induced sprout inhibition treatments were accompanied by an absence of shrivelling with little or no deterioration of quality and with no reduction of yield of U.S. no. 1 potatoes. Apical dominance of both tubers and individual sprouts on the tubers was destroyed. The percentages of reducing and non-reducing sugars were lower in maleic hydrazide treated potatoes stored at 45° F. than in the controls. The possible significance of maleic hydrazide in controlling the degradation of starch to sugar in the storage of potatoes at low temperatures as well as the inhibition

of sprouting at high temperatures is discussed. [From authors' summary.]

2766. BAUMEISTER, W.
Kartoffellagerversuche mit Agermin, Belvitan K und Rhizopon C. **(Potato storage trials with Agermin, Belvitan K and Rhizopon C.)**
Angew. Bot., 1951, **26**: 33-5, bibl. 4.
In two years' trials with several potato varieties the three proprietary chemicals considerably reduced weight losses and sprouting during storage. Agermin, the most successful of the substances tested, is based on phenylurethane and has a respiration-inhibiting effect, while the two other substances are synthetic growth substances.—Münster Univ.

Noted.

2767.

a BOYD, A. E. W.
Potato haulm destruction; the position in Scotland.
Scot. Agric., 1952 (Spring), pp. 204-7, bibl. 4.
Chemical and mechanical methods.

b CORSTIAENSEN, W. P. M.
Machines voor het rooien van consumptie-aardappelen. **(Machines for harvesting ware potatoes.)**
Publ. Inst. Landbouwtech. Wageningen. **5**, 1950, pp. 36, from title in *Landbouwk. Tijdschr.*, 1951, **63**, 704.

c GANGULY, A.
The potato and the virus diseases.
Sci. and Cult., 1951, **16**: 348-52, bibl. 7, illus.
A review of recent work.

d GRANCINI, P.
Andamento della carica afida e produzione di patate da semina in Italia. **(Number of aphids in relation to the production of seed potatoes in Italy.)**
Not. Mal. Piante, 1951, No. 17, pp. 56-60, bibl. 2.

e JACKS, H.
Compatibility of spray materials used in New Zealand on potatoes.
Orchard. N.Z., 1952, **25**: 1: 16-17.
36 materials.

f KANNGIESSER, W.
Polarographische und papierelektrophoretische Charakterisierung von Kartoffelproteinen in ihrer Beziehung zu Kartoffelvirosen. **(Polarographic and paper electrophoretic characterization of potato proteins in their relation to potato viruses.)**
Phytopath. Z., 1952, **18**: 447-52, bibl. 5, illus.

g LORENZ, O. A.
Potato growth studies.
Calif. Agric., 1951, **5**: 11: 13-14.
For another account of these micro-climatic studies see *H.A.*, 21: 1740.

h MINISTRY OF AGRICULTURE, LONDON.
Potato and tomato blight.
Adv. Leafl. Minist. Agric. Lond. **271**, 1951, pp. 6, illus., 2d.

i MINISTRY OF AGRICULTURE, LONDON.
Wart disease of potatoes.
Adv. Leafl. Minist. Agric. Lond. **274**, 1951, pp. 5, illus., 2d.
Synchytrium endobioticum.

j MINISTRY OF AGRICULTURE, LONDON.
Powdery scab of potatoes.
Adv. Leafl. Minist. Agric. Lond. **99**, 1952, pp. 4, illus., 2d.

k NAGANNA, B.
Potato pyrophosphatases.
Curr. Sci., 1951, **20**: 101-2, bibl. 7.

l PANJAN, M., AND LUŠIN, V.
Ispitivanja diferencijalnih biljaka na A i Y-virus. **(Test plants for the potato viruses A and Y.)** [English summary 9 lines.]
Glasnik. biol. Sek. Zagreb, 1948/49 (issued 1950), **2/3**: 22-5, bibl. 4, illus.
Solanum ochroleucum, *S. douglasii* and *Datura metel.*

m THIRUMALACHAR, M. J.
Root-knot nematode on potato tubers in Simla.
Curr. Sci., 1951, **20**: 104, illus.
Scab-like warts on tubers due to *Heterodera marioni.*

n THIRUMALACHAR, M. J.
Ozonium wilt disease of potato.
Curr. Sci., 1951, **20**: 244-5, bibl. 2, illus.
Caused by *Ozonium texanum* var. *parasiticum* sub-sp.nov.

TOBACCO.

General.

(*See also* 2278, 3194, 3236.)

2768. ALLAN, J. M.
Cultivation of tobacco in Western Australia.
J. Dep. Agric. W. Aust., 1951, **28**: 349-72, illus.
In 1923 the first concerted efforts were made to ascertain if commercially valuable tobacco could be grown in Western Australia. The industry can be regarded as starting in 1930 when 25 acres were planted. The acreage reached a peak in 1942-3 with 1,579 acres. More recently it has diminished, reaching its lowest ebb in 1945-6 of 296 acres. It is pointed out that the average yield in the south-west of Western Australia compares favourably with that of other tobacco growing areas. The factors suitable for tobacco growing are set out under (1) climate; a map is given showing the probable tobacco belt for the region. (2) soil; a short-fractured yellow or brown mottled clay subsoil at a depth of 18 to 30 in. indicates that the soil will probably retain sufficient moisture. (3) water.

The locally developed variety Cross Hickory is now grown almost exclusively. Notes are given on all aspects of cultivation.

2769. Marais, J. S. C.
Quality in tobacco is essential.
Fmg S. Afr., 1952, **27**: 27-8.

Suggestions are made on varieties of flue-cured tobacco, the management of seedbeds to produce sound, healthy plants, transplanting, rotations, nutrition, cultivation and harvesting, based on experience gained at the Central Tobacco Research Station, Rustenburg. For the protection of seedbeds against diseases and pests regular weekly dusting with a mixture containing 2½% DDT, 5% copper and 25% sulphur is recommended; BHC preparations should be avoided because they injure the seedlings. A 3-year rotation that has given good results is: 1st year tobacco followed by wheat or oats, 2nd year sunnhemp ploughed under followed by oats or wheat, 3rd year maize followed by winter fallow.

Cultivation and nutrition.

2770. Schmitt, L., and Jungermann, K.
Kalkstickstoff als Desinfiziens von Anzuchterde unter besonderer Berücksichtigung der Tabakanzucht. **(Calcium cyanamide as a disinfectant of seed bed soils with special reference to tobacco raising.)**
Landw. Forschung, 1950, **2**: 85-95, illus.

In trials at the Darmstadt Agricultural Research Institute calcium cyanamide applied at the rate of 3 kg. per cubic metre compost soil 4 weeks before seeding did not affect the number of tobacco seedlings, and when the crop was sown 6 weeks after application higher yields were obtained than on the untreated control plots. Higher rates of application, i.e. 6 to 9 kg. were, however, found harmful and reduced yields. Weed emergence was retarded for a considerable time after the calcium cyanamide treatment.

2771. Johanson, R.
Chemical investigation of "trashy" leaf phenomenon in Australian-grown flue-cured tobacco.
Aust. J. sci. Res., Ser. B, biol. Sci., 1951, **4**: 231-47, bibl. 61, illus.

Trashy leaf is a common source of loss in tobacco growing areas of the eastern states of Australia. This paper reports the first work on the chemical nature of trashy leaf, with particular reference to nitrogen and carbohydrate distribution. With flue-cured leaf, trashy leaf was found to be much lower in sugars, and to show a higher N content (total N, protein N and ammonia N —but lower amide N), and less weight per unit area. Since these differences were also found with uncured leaf, it is concluded that trashiness is not produced by the flue-curing process but is due to intrinsic properties of the uncured leaf associated with low carbohydrate and high N contents. The author reviews his findings in detail in the light of data presented in the literature and concludes that trashiness is a direct outcome of unfavourable amounts of nitrogen, sunlight and temperature. Agricultural measures recommended to suppress its development are: providing the minimum necessary nitrogen supply and producing the crop in areas where the rate of respiration is retarded by relatively low night temperatures (to decrease the total energy "spent" irreversibly), wider spacing of plants and planting in areas where the days are relatively long (to increase the total available energy). A.C.S.

2772. Gigante, R.
La maculatura concentrica delle foglie di tabacco. **(The concentric spotting of tobacco leaves.)** [English summary ⅛ p.]
Boll. Staz. Pat. veg. Roma, 1949 (issued 1951), **7**: 101-11, bibl. 4, illus.

A concentric spotting of tobacco leaves, seen in August 1948, on the variety Maryland at the Plant Pathology Station, Rome, is described. The spotting is a non-parasitic disease, caused by excess of soil moisture and favoured by excess of nitrogenous fertilizers and deficiencies of potassium and phosphorus. It may be identical with blackfire described from America.

Composition.

(*See also* 2793b.)

2773. Dawson, R. F.
Chemistry and biochemistry of green tobacco.
Industr. Engng. Chem., 1952, **44**: 266-70, bibl. 22.

Environmental influences, especially moisture and mineral nutrition, may result in extensive modification in the relative proportions of nitrogenous and carbohydrate constituents with attendant changes in smoking properties of the manufactured product. A unifying concept built around the Krebs tricarboxylic acid cycle may be developed to account for inherited and culturally induced modifications in tobacco composition. Available evidence appears to be in reasonable agreement with this concept. Rather large gaps in basic information revealed by these considerations point to the need for extensive investigation of the constituents and the chemical processes of living tobacco. [From author's synopsis.]

2774. Middelburg, H. A.
Donnan-evenwichten en de samenstelling van tabaksas. **(Donnan-equilibria and the composition of tobacco ash.)** [English summary ¼ p.]
Landbouwk. Tijdschr., 1950, **62**: 306-11, bibl. 5 [received 1952].

The following facts are explained on the basis of the Donnan distribution of ions: (1) The ratio of cations in the ash of tobacco is a reflection of their ratio in the soil adsorption complex. (2) The Ca/K ratio depends on the exchange capacities of the soil. (3) The SO_4/Cl ratio depends on the exchange capacities of the plant roots. (4) The ratios of ions in tobacco ash correlates with the N content of the plant tissues. (5) A preferential adsorption of certain ions may be determined genetically.

2775. Middelburg, H. A.
Polyphenolen in tabak. **(Phenolic compounds in tobacco.)** [English summary ⅛ p.]
Landbouwk. Tijdschr., 1951, **63**: 392-7, bibl. 11.

It has previously been shown that there is a positive

correlation between quality and polyphenol content in tobacco. Investigations in Java showed that the amount of phenolic compounds in freshly harvested tobacco leaves depends on soil conditions, and that the polyphenol content can be maintained by a rapid dehydration of the tissues and suppression of the oxidative reactions. A high polyphenol content can therefore be regarded as an indication that the tobacco has been dried rapidly. Some curing systems which have given satisfactory results experimentally are tabulated.

2776. Willaman, J. J.
Alkaloids of tobacco; identification and determination.
Industr. Engng. Chem., 1952, **44**: 270-3, bibl. 54.

The value of some newer techniques in studying the chemistry of tobacco is exemplified by their application to tobacco alkaloids and their derivatives. The newer techniques mentioned are ultra-violet and infra-red spectrophotometry, chromatography, countercurrent distribution, photochemical oxidation, reciprocal grafts with *Nicotiana*, radioactive tracers, statistical analysis, and improved pyrolysis, distillation, and colorimetric procedures. It is suggested that what has been so fruitful with alkaloids will be equally fruitful for other groups of tobacco constituents. (From author's synopsis and summary.]

2777. Ganz, A., Kelsey, F. E., and Geiling, E. M. K.
Biosynthesis of radioactive nicotine.
Bot. Gaz., 1951, **113**: 195-203, bibl. 8, illus.

Using the photosynthetic mechanism of the tobacco plant to incorporate radioactive carbon dioxide into its constituents, radioactive nicotine has been prepared. The highest activity of radio-active nicotine obtained was 501,000 c.p.m./mg. (0·3503 μc./mg.). A highly convenient and sensitive spectrophotometric method [which eliminates the disadvantage of sample destruction] has been developed for the analysis of nicotine in tobacco extracts. The value of the specific radioactivity of extracted nicotine per unit of radioactivity administered to the plant is roughly constant when different amounts of radioactivity are given to young tobacco plants. The value averaged 529 c.p.m./mg. of nicotine/microcurie of radiocarbon injected as $C^{14}O_2$. [From authors' summary.]—Dept. Pharmacology, Univ. Chicago.

2778. Griffin, E. L., Jr., and others.
Nicotine sulfate from *Nicotiana rustica*.
Industr. Engng Chem., 1952, **44**: 274-9, bibl. 3, illus.

This work illustrates a new process for recovering nicotine from green plants containing substantial amounts of nicotine, which can be expressed effectively. The general process may also be applicable to the isolation of valuable constituents from other plants, provided that these constituents can be expressed in the liquor and a suitable immiscible solvent can be found. With the exception of expression of juice, all operations can be carried on throughout the year. The process eliminates the necessity for drying the plant material, and substitutes expression of juice for the steam distillation step normally used with tobacco stems. The overall recovery of nicotine from the green plants can be relatively high, but in practice it will probably not be economical to recover more than about 85%. [From authors' discussion.]—Eastern Regional Res. Lab., Philadelphia.

Diseases.

(*See also* 2793e, f, g.)

2779. Singer, S. J., and others.
The detection and isolation of naturally occurring strains of tobacco mosaic virus by electrophoresis.
Science, 1951, **114**: 463-5, bibl. 10.

An electrophoretic investigation of the cytoplasmic proteins in tobacco plants infected with tobacco mosaic virus has revealed the presence of two virus components, which have been further distinguished by serological methods. The study described here will be reported in greater detail elsewhere.

2780. Stover, R. H.
A strain of tobacco mosaic virus causing vascular necrosis and wilt of tobacco in Ontario.
Sci. Agric., 1951, **31**: 424-8, bibl. 11, illus.

A strain of tobacco mosaic which induces severe necrosis in tobacco varieties carrying the N′N′ genes was found in Ontario tobacco fields; it also caused a chlorotic mosaic mottle, stunting, and distortion in tobacco varieties carrying the n′factor. It gave rise to a mutant that differed from the parent strain in mottling characteristics on different hosts but was still capable of causing primary necrotic lesions on the N′ varieties. There is evidence that the virus is transmitted by insects. It is of little economic importance at present.—Lab. Plant Path., Harrow, Ontario.

2781. Yarwood, C. E.
Some relations of carbohydrate level of the host to plant virus infections.
Amer. J. Bot., 1952, **39**: 119-24, bibl. 14, illus.

A study was made of the effect of carbohydrate level in tobacco, sunflower and bean leaves on the degree of infection by the tobacco-mosaic, tobacco ring-spot and white clover-mosaic viruses. The data obtained show that host species vary greatly in their susceptibility to infection at different carbohydrate levels. In a compatible reaction type (e.g. tobacco-mosaic on tobacco, white clover-mosaic on bean) no effect of carbohydrate level was apparent when detached leaves were placed in sugar solution or water. In a necrotic reaction type (e.g. tobacco-mosaic on bean, tobacco-necrosis on bean) virus multiplication was greatest in leaves at a low carbohydrate level. Inoculated bean leaves detached from plants in the early morning produced larger tobacco-mosaic lesions with a higher virus content than leaves detached in the late afternoon. Rust infection increased the rate of multiplication of tobacco-mosaic virus in bean leaves, but when rust infection was checked by placing the leaves on water at 25° C. in the dark virus multiplication was not similarly checked. Placing leaves in the dark before inoculation increased the number of lesions of tobacco-mosaic virus on bean, while placing leaves in the dark

after inoculation decreased the number of lesions but increased their size.—Univ. Calif., Berkeley.

2782. Beale, H. P., and Jones, C. R.
Virus diseases of tobacco mosaic and potato yellow dwarf not controlled by certain purified antibiotics.
Contr. Boyce Thompson Inst., 1951, **16**: 395-407, bibl. 13, illus.

Solutions of the purified antibiotics, sodium penicillin, streptomycin sulphate, chloramphenicol, aureomycin hydrochloride or sodium terramycin were introduced by means of a wick into *Nicotiana tabacum* and *N. rustica*, and the plants were inoculated later with tobacco-mosaic virus and potato yellow dwarf virus respectively. The antibiotics were also tested *in vitro* for the possible inactivation of tobacco-mosaic virus. It was concluded that, under the conditions of the experiment, the antibiotics tested were all ineffective in controlling these virus diseases.

2783. Kutsky, R.
Effects of indolebutyric acid and other compounds on virus concentration in plant tissue cultures.
Science, 1952, **115**: 19-20, bibl. 2.

Among 20 compounds tested on tobacco mosaic virus in tobacco stem tissue cultures only indolebutyric acid used at a concentration of 100 mg./l., like naphthaleneacetic acid in an earlier trial,* proved effective in reducing virus concentration.

2784. Commoner, B., and Mercer, F. L.
The effect of thiouracil on the rate of tobacco mosaic virus biosynthesis.
Arch. Biochem. Biophys., 1952, **35**: 278-89, bibl. 27.

Low concentrations of thiouracil inhibit the rate of tobacco mosaic virus biosynthesis in isolated sterile disks of tobacco leaf tissue under continuous illumination and supply of nutrient. The inhibitory effect of thiouracil is partially reversed by the simultaneous presence of an excess of macil. The inhibitor appears to have no effect on the properties of the virus. [From authors' summary.]—Washington Univ., St. Louis, Mo.

2785. Matthews, R. E. F.
Effect of purines on the multiplication of plant viruses.
Nature, 1952, **169**: 500-1, bibl. 1.

The reversal of the virus inhibiting effects of the substituted purine, guanazolo (5-amino-7-hydroxy-I-V-triazolo (D) pyrimidine) by some naturally occurring purine was studied at the Plant Diseases Division, D.S.I.R., Auckland, N.Z. The compounds were sprayed on the leaves before inoculation. Using lucerne mosaic virus in *Nicotiana glutinosa* or *N. tabacum*, adenine, guanine and hypoxanthine were found to reverse the activity of guanazolo, whereas 8 other purines did not.

2786. Gigante, R.
Un avvizzimento del tabacco causato da "Fusarium". **(A wilt disease of tobacco caused by a *Fusarium* sp.)**
Boll. Staz. Pat. veg. Roma, 1949 (issued 1951), **7**: 113-18, bibl. 7, illus.

A serious wilt disease found in tobacco growing near Rome is described. The wilting can occur on plants at all stages of development. The species of *Fusarium* concerned has not yet been determined. For control it is recommended that the plants be kept in a vigorous condition. Affected plants should be taken up with their whole root system and burnt.

2787. Anderson, P. J.
Combating blue mold of tobacco.
Circ. Conn. agric. Exp. Stat. **181**, 1952, pp. 12, illus.

Symptoms of blue mould, life history of the causal organism, *Peronospora tabacina*, and the influence of weather on the severity of attack are described. For control, the use of ferbam and zineb are recommended on both seedlings and plants in the field and satisfactory methods of application are indicated.

2788. Valleau, W. D.
Longevity of the tobacco black shank fungus in the soil in the absence of tobacco.
Plant Dis. Reptr, 1951, **35**: 453-4.

Field observations indicate that the tobacco black shank fungus, *Phytophthora parasitica* var. *nicotianae*, may disappear completely from the soil in 3 years and a black-shank-free crop may be grown, provided there is no recontamination from surface drainage from a black shank field or from soil on shoes, tools, etc.—Ky agric. Exp. Stat., Lexington.

Curing.

(*See also* 2793a, c.)

2789. Gutierrez, M. E., and Bayubay, S.
Tests on flue-curing temperature standards for three regional leaf classes of Virginia tobacco varieties.
Philipp. J. Agric., 1950 (issued 1951), **15**: 61-75, bibl. 5, illus.

In an old-fashioned flue-curing barn in an area not very well adapted to the culture of Virginia tobacco, the sand leaves of three varieties were satisfactorily cured in 54 hours, during which the temperature in the barn rose from 29° C. to 71° C., and lower and middle standard leaves were cured in 58 hours, during which the temperature rose from 30° C. to 71° C. With both types of leaf the yellowing stage took 29 hours, but whereas the sand leaves needed only 11 hours to fix the yellow colour the standards needed 21 hours; the latter, however, were dried in 8 hours compared with 14 hours for the sand leaves. Of the three varieties used in the tests Eastern Carolina produced the highest average percentage of yellow leaves, viz. 76·8%, Gold Dollar came next with 67·1% and Cash last with 60·0%.

2790. Darkis, F. R., and others.
Flue-cured tobacco; chemical composition of rib and blade tissue.
Industr. Engng Chem., 1952, **44**: 297-301, bibl. 19.

This study gives comparative chemical analyses of the different portions of leaves of flue-cured tobacco after separation into midrib tissues, secondary veins, veinules, and blade tissues. In general, the results indicate that veinule tissues are most nearly like blade tissues, with secondary vein tissues next in similarity, and midrib

* Kutsky, R. J., and Rawlins, T. E., *J. Bact.*, 1950, 60: 763.

tissues least like blade tissues. The midrib tissues were found to be significantly different from the laminar tissue. These chemical findings validate the practice of eliminating stem tissues from tobacco used in the manufacture of cigarettes. [Authors' synopsis.]

2791. Jensen, C. O.
Cigar tobaccos; chemical changes that occur during curing.
Industr. Engng Chem., 1952, **44**: 306-9, bibl. 48.

Considerable modification of the chemical composition of cigar leaf tobacco takes place during air curing. In addition to the obvious loss of water there is a decrease of from 10 to 30% in the dry weight of leaves. Greater curing losses take place in leaves attached to stalks than in leaves removed from the stalks (primed leaves). Potassium and phosphorus migrate from the leaf during stalk-curing whereas calcium and magnesium do not. During curing, starch and sugars decrease rapidly but no loss of crude fiber takes place. There is a marked decrease of malic acid accompanied by a large increase of citric acid. A rapid destruction of chlorophyll occurs. Changes in the nitrogenous compounds are particularly evident as shown by the disappearance of 30% or more of the protein fraction and a large increase in water-soluble nitrogenous compounds. These soluble compounds include amides, ammonia nitrogen, thiamine, and pantothenic acids. A small fraction of the original nicotine disappears. [Author's synopsis.]

2792. Frankenburg, W. G., and Gottscho, A. M.
Nitrogen compounds in fermented cigar leaves.
Industr. Engng Chem., 1952, **44**: 301-5, bibl. 52.

During the phases of processing that precede the fermentation, about half of the initial leaf protein is hydrolyzed by the leaf enzymes and yields considerable amounts of amino acids. A large part of these amino acids undergoes oxidative deamination with the formation of ammonia, which, after having reached a maximal concentration in the leaves, evaporates gradually during fermentation. The remaining amino acids react with other constituents of the tobacco leaves, probably with polyphenolic substances, yielding condensation products of increasing molecular size and decreasing solubility in water. As a net result of these reactions, only very small amounts of amino acids are left in the leaves after fermentation. The nitrates remain almost unaffected by the fermentation, but the contrary applies to nicotine and the related alkaloids of the leaves. These findings, in conjunction with studies of the catalytic and enzymic mechanism, have helped in replacing the traditional, purely empirical art of tobacco fermentation by a catalytically controlled procedure which yields a mild and aromatic product of very low alkaloid content. [From authors' synopsis.]

Noted.

2793.

a Bacon, C. W., Wenger, R., and Bullock, J. F.
Chemical changes in tobacco during flue-curing.
Industr. Engng Chem., 1952, **44**: 292-6, bibl. 27.
See *H.A.*, 22: 1689.

b Brown, S. A., and Byerrum, R. U.
The origin of the methyl carbon of nicotine formed by *Nicotiana rustica* L.
J. Amer. chem. Soc., 1952, **74**: 1523-6, bibl. 26.

c Darkis, F. R., and Hackney, E. J.
Cigarette tobaccos; chemical changes that occur during processing.
Industr. Engng Chem., 1952, **44**: 284-91, bibl. 36.

d Houston, F. G., and Hamilton, J. L.
Rapid determination of organic acids in cured tobacco.
Analyt. Chem., 1952, **24**: 415-16, bibl. 2.

e Sibilia, C.
Le cuscute e le virosi. **(Dodder and viruses.)**
Boll. Staz. Pat. veg. Roma, 1949 (issued 1951), **7**: 205-15, bibl. 26.
Particular reference to transmission of tobacco and tomato viruses.

f Takahashi, W. N., and Ishii, M.
An abnormal protein associated with tobacco mosaic virus infection.
Nature, 1952, **169**: 419-20, bibl. 3.

g Valleau, W. D.
Breeding tobacco for disease resistance.
Econ. Bot., 1952, **6**: 69-102, bibl. 5 pp.
A review.

MISCELLANEOUS TEMPERATE AND TROPICAL CROPS.

Aromatics and essential oils.

2794. Short, G. R. A.
Essential oils, isolates and derivatives.
Reps Progr. appl. Chem. 1949, **34**: 685-94, bibl. 87 [received 1952].

Investigations of aromatic plants in various parts of the world, particularly Kashmir and Morocco, are reported and the characteristics of a number of oils from lesser known sources are given.

2795. Waygood, W. A.
Essential oils.
Reps Prog. appl. Chem. 1950, **35**: 700-12, bibl. 120 [received 1952].

This résumé of recent work deals mainly with the examination of a variety of oils from many sources, some of them new to the industry, and investigations on oil producing plants in India and Australia.

2796. Hough, L., Jones, J. K. N., and Wadman, W. H.
Some observations on the constitution of gum myrrh.
J. chem. Soc. Lond., 1952, pp. 796-800, bibl. in text.

The gum resin is exuded from the bark of *Commiphora myrrha*. In recent times the substance has found its

way into medicine as an antiseptic after many centuries' use as an incense.—Bristol University.

2797. Gupta, G. N., and Chandra, G.
Oil of cyperiol (*Cyprus scariosus*).
Curr. Sci., 1951, **20**: 273, bibl. 1.

The constants are given of an essential oil with good fixative properties which is yielded by the tubers of *Cyprus scariosus*.

2798. Brown, E., Islip, H. T., and Matthews, W. S. A.
Lavender oil from Tanganyika.
Colon. Plant. Anim. Prod., 1950, **1**: 308-12.

The samples submitted were, according to analytical figures and commercial opinions, of the English lavender type; but, being of lower quality and with the demand for oil of this type being already met, further planting of English type lavender is not recommended. However, with the very extensive market for French lavender oil, cultivation in Tanganyika of lavender obtained from France or the French colonies is considered well worthy of trial. A.C.S.

2799. Islip, H. T., and Matthews, W. S. A.
***Lippia carviodora* from Somaliland Protectorate.**
Colon. Plant Anim. Prod., 1951, **2**: 96-101.

This oil sample proved very similar to previous samples from Kenya, but the oil yield, at over 3% from dried leaves, was about 3 times as much. A market should exist for such oil for flavouring and perfumery purposes, or as a source of carvone, at a price a little below that of caraway seed oil. A.C.S.

2800. Brown, E., Islip, H. T., and Matthews, W. S. A.
Patchouli oil from Tanganyika.
Colon. Plant Anim. Prod., 1950, **1**: 312-15.

The sample submitted, obtained from plants grown at 4,400 ft. and with a 50 in. rainfall, was unfortunately slightly contaminated, but indications were that such oil, if free from contamination, would find a ready market. Commercial production is recommended if economic at the anticipated future price of around 35s. per lb. A.C.S.

2801. Wilbaux, R.
Note sur l'essence de vétiver du Congo Belge. **(Note on vetiver oil in the Belgian Congo.)**
Bull. agric. Congo belge, 1950, **41**: 765-72.

In the Belgian Congo, as elsewhere, the yield of oil from dried roots varies considerably—but is mostly between 1% and 2%. After discussing distillation procedure, the paper lists the analytical constants of vetiver oil as recorded from various sources including those obtained with different samples in the Belgian Congo. A somewhat wider range of analytical constants than those laid down in 1948 by the U.S.A. Essential Oil Association is proposed for exports of oil to destinations other than the U.S.A. A.C.S.

Bamboos.

2802. Renier, R. P. M.
Les bambous des plateaux du Kwango, matière première de la pâte à papier. **(The bamboos of the Kwango plateaux, raw material for paper pulp.)**
Bull. agric. Congo belge, 1950, **41**: 741-64.

A general review of the conditions necessary for establishing bamboo, especially *Bambusa vulgaris*, plantations for paper manufacture in the Kwango plateaux. A.C.S.

2803. Hambleton, E. J., and McClure, F. A.
Rhinoceros beetle, *Podischnus agenor* (Ol.), damages bamboo shoots.
Turrialba, 1951, **1**: 199-201, bibl. 4, illus.

The occurrence of the rhinoceros beetle on *Bambusa vulgaris* and *Gigantochloa apus* in 3 localities in Guatemala is recorded, and the damage done to the shoots is described. An outline is given of the biology of the beetle and it is suggested that the pest could be controlled biologically by the giant Surinam toad, *Bufo marinus*, which has given excellent control of the sugar cane rhinoceros beetle in Puerto Rico.

2804. Mayne, J. E., and Mohamad bin Jamil.
An unusual problem in land clearing.
Trop. Agriculture, Trin., 1950, **27**: 231-5, reprinted in *J. agric. Soc. Trin. Tob.*, 1951, **51**: 51-9.

A description is given of the cleaning of an old cultivated bamboo plantation with a Caterpillar D.7 fitted with an angledozer. Felling at a rate of over 2 acres a day was followed by burning, rough levelling and drainage with cambered beds. Two years were required completely to dispose of the bamboo stools. Costs of the various operations are given, the estimated overall cost being £19 12s. 0d. per acre.

2805. Delgado, R. F.
The effect of bamboo on succeeding crops.
Trop. Agriculture, Trin., 1951, **28**: 50-2, bibl. 4, illus.

An area of Catalina clay soil which had been planted to bamboo, *Bambusa longispiculata*, for 10 or more years was cleared and the rhizomes dug out and removed from the land. Records kept on fertilized and unfertilized bananas, sweet potatoes, molasses grass and kudzu planted on the site showed that these produced yields that were equal to, or higher than normal.—Federal Exp. Stat., Puerto Rico.

Drugs.

(*See also* 2825, 2849b, d, g, n.)

2806. Dietz, R.
Aktuelle Fragen der Arzneipflanzenkultur. **(Practical questions on the culture of medicinal plants.)**
Bodenkultur, 1951, **5**: 482-91, bibl. 15.

Soil and climate requirements of a long list of medicinal plants are tabulated and discussed with a view to encouraging the extension of their cultivation in Austria. Attention is drawn to some biochemical and physiological problems.

2807. Sillans, R.
Sur quelques plantes médicinales de l'Afrique centrale. **(Some medicinal plants of central Africa.)**
Rev. int. Bot. appl., 1951, **31**: 407-27, bibl. 87, illus.

Following a historical survey the author lists, with brief descriptions, a large number of plants of French

central Africa according to their uses in native medicine. [Note the extensive bibliography.]

2808. Bhattacharji, S., Sharma, V. N., and Dhar, M. L.
Chemical examination of the roots of *Cissampelos pareira* Linn.
J. sci. industr. Res. India, 1952, **11B**: 81-2, bibl. 4.

The roots of the climbing shrub *Cissampelos pareira*, used in medicine, contained an alkaloid provisionally named hayatin, m.p. 303° C., a subsidiary alkaloid named hayatinin, m.p. 163° C., quercitol and a sterol. No pelosine was found, though this has been reported to occur in the roots of South American *C. pareira*.—Central Drug Res. Inst., Lucknow.

2809. Rudorf, W., and Schwarze, P.
Polyploidie-Effekte bei *Datura tatula*. **(The effect of polyploidy on *Datura tatula*.)**
Planta, 1951, **39**: 36-64, bibl. 24.

In a field trial tetraploid *Datura tatula* plants yielded 52-174% more alkaloids than diploids, although their leaf area was smaller. The reduced size of the polyploid plants would, moreover, allow of closer spacing and hence of a further increase in yield per unit area. Tetraploids and diploids responded similarly to fertilizer treatments, but the utilization of available nutrients was inferior in the polyploids. The effect of chromosome doubling on the morphology of the plant and other characters is discussed.

2810. Barnard, C.
The duboisias of Australia.
Econ. Bot., 1952, **6**: 3-17, bibl. 74, illus.

Species of *Duboisia* are described, particularly *D. myoporoides* and *D. leichhardtii*, from the leaves of which alkaloids, mainly atropine and hyosine are obtained.

2811. Gardner, C. A., and Bennetts, H. W.
Poison plants of Western Australia. I. Pituri (*Duboisia hopwoodii* [F. Muell.] F. Muell.).
J. Dep. Agric. W. Aust., 1952, **1** (n.s.): 53-6, illus.

Among the drug-yielding plants used by the Australian aborigines is one called "pituri" by the Central Australian tribes. The leaves of this plant have narcotic properties, the toxic substances being nicotine and nor-nicotine. The effects of the poison on man and on sheep are described.

2812. Hills, K. L., and Rodwell, C. N.
Variation in the alkaloids of clones of northern *Duboisia myoporoides* R.Br.
Aust. J. sci. Res., Ser. B, biol. Sci., 1951, **4**: 486-99, bibl. 5.

A study was made during 1946-49 of the variation in total alkaloids and in the hyosine content of 7 clones of the hyoscine type of *D. myoporoides* grown in two different climatic locations. The most probable explanation of the consistent differences observed in hyoscine content is that clones differ genetically in their capacity to produce hyoscine; the differences do not appear to be related to the geographical origin of the seed or to vegetative characters. Total alkaloids and hyoscine contents were of the same order of magnitude in both climatic locations. Hyoscine seldom comprised more than two-thirds of the total alkaloids found and in one sample was as little as one-tenth. The amount of hyoscine present was not related to the amount of other alkaloids, which included hyoscyamine and valeroidine. A.C.S.

2813. R., D.E.
Ephedra.
Colon. Plant Anim. Prod., 1951, **2**: 119-24, bibl. 10.

A review of the literature on *Ephedra vulgaris*, the source of the alkaloid ephedrine.

2814. Giordano, B.
Flora spontanea calabrese. Liquirizia pianta officinale e industriale. **(Native flora of Calabria. Liquorice, a commercial drug plant.)**
Humus, 1951, **7**: 11: 10-13.

Two species grow, *Glycyrrhiza officinalis* or *glabra* a surface rooting plant growing in heavy soils, and *G. echinata* a deep rooting plant growing in lighter soil types. The product, derived from the roots, is used medicinally, for colouring velvets, curing cigar tobacco and for giving sparkle and aroma to beer. The author makes a plea for research to determine the best methods of cultivation to replace the present haphazard ones. Some 200,000 quintals of the raw materials are produced yearly in southern Italy and one or two factories look after its extraction and marketing.

2815. Chatterjee, G. S., and Maitra, S. R.
A note on physiological and clinical findings of the active principle (spirochin) of the *Moringa pterygosperma*.
Sci. and Cult., 1951, **17**: 43-4, bibl. 3.

The fruits of *M. pterygosperma* are used as a vegetable in India, and various parts of the plants are used medicinally.

2816. Angell, H. R., and Hills, K. L.
Seedling blight III. Control of seedling blight of opium poppy by liming.
J. Aust. Inst. agric. Sci., 1951, **17**: 17-24, bibl. 12, illus.

Investigations at Canberra showed that species of Pythiaceae, most probably of the genus *Pythium*, caused seedling blight of poppy (*Papaver somniferum* L.). In pot experiments, the blight was not controlled by seed dusting (6 fungicides tried), nor by additions of farmyard manure or full nutrient solution. However, field trials confirmed that liming gives adequate control, the lime being applied before seeding either at a low rate along the rows or at a higher rate worked into the soil; higher rates applied in the row had a deleterious effect. The mechanism by which liming the soil possibly controls the disease is discussed. A.C.S.

2817. (Schultes, R. E.)
Le *Paullinia yoco* et son emploi comme stimulant. **(*Paullinia yoco* and its use as a stimulant.)**
Rev. int. Bot. appl., 1951, **31**: 279-90, bibl. 22, illus.

This is a translation of a paper, of which we have not seen the original. The yoco, a native of tropical

South America, is a jungle liane yielding caffeine. The plant is described and illustrated, and the literature on it and its use by the Indians of the area is discussed.

2818. Raymond-Hamet, —.
Sur une drogue remarquable de l'Afrique tropicale, le " Picralima nitida " (Stapf) Th. et H. Durand. **(A remarkable tropical African drug, *Picralima nitida*.)**
Rev. int. Bot. appl., 1951, **31**: 465-85, bibl. extensive, illus.
A detailed review of the literature is given on this small tropical African tree and the alkaloids obtained from it.

2819. Chevalier, A.
Les plantes-poisons de l'Oubangui et du Moyen Congo. **(The plant poisons of Oubangui and the Moyen Congo.)**
Rev. int. Bot. appl., 1951, **31**: 249-57.
Mention is made, in some cases with descriptions, of a number of plants, including 4 species of *Strophanthus*, from which the natives of French West Africa extract poisons, mainly for use on arrows.

2820. Gomes Pedro, J.
Plantas úteis da flora de Moçambique. I. Os estrofantos. **(Useful plants of Mozambique. I. *Strophanthus* spp.)**
Gaz. Agric. Moçambique, 1950, **11**: 55-9, illus. [received 1952].
Notes on the history, botany and uses of *Strophanthus*. The seeds have been used in the production of arrow poisons and the drug sarmentogenin. Brief descriptions are given of the species found in Mozambique.

2821. Creech, J. L., and Dowdle, R. F.
Propagation of strophanthus.
Econ. Bot., 1952, **6**: 48-53, illus.
At the U.S. Plant Introduction Garden in Maryland, optimum conditions for the germination of strophanthus seed were found to be a temperature of 72-75° F. and 85% humidity in sphagnum moss. Transplanting of seedlings was successfully carried out in the cotyledon stage. Softwood cuttings obtained from unrooted woody cuttings and plants rooted easily when treated with IBA 4 mg./g. of talc.

Fibres.

(*See also* 2237f, 2849j, 3212.)

2822. Feuell, A. J., Jarman, C. G., and Kirby, R. H.
Silk grass from British Honduras.
Colon. Plant Anim. Prod., 1951, **2**: 112-14.
A sample of fibre from *Aechmea magdalenae*, a relative of the pineapple, is considered to show much promise, and it is suggested that a bulk sample be submitted for spinning tests.

2823. Lima, M. C. de A.
Observações realizadas sôbre o beneficiamento e industrialização de fibras duras nas Republicas do Mexico e Haiti. **(The cultivation and industrialization of hard fibres in Mexico and Haiti.)**
Bol. Sec. Agric. Pernambuco 1951, **18**: 81-120, illus.
A tour of henequen (*Agave fourcroydes*) and other fibre plantations in Mexico and Haiti was made with a view to improving production and processing in the Brazilian State of Pernambuco. Among conclusions reached is the necessity for cultural experiments in different parts of the State and for centralizing the introduction, acclimatizing and breeding of fibre plants. Hybrids produced at Amani in Africa, which combine the good fibre quality of *Agave sisalana* with the productivity of *A. angustifolia*, are of probable interest for the region.
G.M.R.

2824. Crane, J. C., and Wellman, F. L.
Edad del henequén en relación con las características de la fibra. **(Age of the henequen plant in relation to the fibre characteristics.)** [English abstract 10 lines.]
Turrialba, 1950, **1**: 74-7, bibl. 4, illus.
From analysis of leaf samples taken from henequen plants 5, 12 and 20 years old, it was found that, regardless of plant age, moisture content of leaves and tensile strength of the fibre decreased progressively with age of leaves. Fibre content was about the same in leaves from all parts of the plant. In order to increase tensile strength, therefore, and at the same time reduce black spot (*Diplodia theobromae*) infection, it is suggested that leaves should either be harvested more frequently or more leaves cut at each harvest.

2825. Callow, R. K., Cornforth, J. W., and Spensley, P. C.
A source of hecogenin.
Chem. Ind. Lond., 1951, No. 33, pp. 699-700, bibl. 4.
In a search for possible sources of cortisone the leaves of *Agave sisalana* were found to contain hecogenin which can be readily extracted. Trials on a pilot plant scale showed that sisal waste is a suitable material for extraction and that the yield of the drug varied from 0·04% to 0·1% on the air-dry weight. The process is described.—Nat. Inst. for Medical Research, Mill Hill, London.

2826. Spoon, W.
Ramie. [English summary ⅓ p.]
Landbouwk. Tijdschr., 1950, **62**: 40-5, bibl. 7 [received 1952].
In view of a renewed interest in the production of ramie in Indonesia and Surinam, a note is given on the quality of some samples of China grass from Java, the industrial value of the fibre, and the fodder value of ramie cake, a by-product prepared from the leaves.

2827. Czaja, A. T.
Einige Düngungsversuche zu Yucca. **(Manurial trials with *Yucca*.)**
Angew. Bot., 1951, **26**: 13-32, bibl. 10.
Two years' experiments with *Yucca filamentosa* grown in containers in the glasshouse showed that mineral deficiency favours rhizome development at the expense of leaf. The fresh weight ratio foliage : rhizome under such conditions was 1 : 2, as against 1 : 1 in plants adequately manured. Full experimental data on the influence of different fertilizer treatments on plant measurements and composition, including copper and manganese content, are tabulated and diagrammatically illustrated. The paper (accepted for publication in 1944) covers only the first phase of an investigation

which is to extend to the effect of manuring on fibre yield and quality.—Technische Hochschule Aachen.

2828. CARILLI, A.
Intumescenze di origine interna su foglie di yucca (*Yucca gloriosa* L.). **(Internal swellings on the leaves of *Yucca gloriosa*.)** [English summary 10 lines.]
Boll. Staz. Pat. veg. Roma, 1949 (issued 1951), **7**: 167-76, bibl. 17, illus.

A histological examination of internal swellings on yucca leaves seen in December 1950, showed definite hypertropy of assimilating tissues. The deep localization of the lesions and the absence of pathogens suggest that they are a physiological disorder, probably resulting from heavy rains in the autumn of that year.

Hops.

(*See also* 2849m.)

2829. HOED, F., AND ELSOCHT, P.
Essai d'introduction de la culture du houblon au Congo belge. **(An attempt to introduce hop-growing in the Belgian Congo.)**
Bull. agric. Congo belge, 1950, **41**: 705-14.

A summary is given of attempts from 1938 onwards to introduce hop-growing in the Belgian Congo. The varieties tried have included: Tettnang, Groene Bel, Hallertau, Fuggles, Styrie and Kent. With one possible exception, the results so far have not been encouraging. It was reported, for example, in 1940 that at Nioka the plants had 2 growth and 2 rest periods a year and that the vines only reached a height of about 3 feet and did not flower. Trial plantings were resumed after the war in 1947 under different conditions of rainfall and altitude; only about one-third or less of the plants grew and the reported height reached did not in general exceed about 5 feet. Further trials are proposed including an attempt to raise from seed a type suited to local conditions. A.C.S.

2830. PREECE, I. A.
The fermentation industries.
Reps Progr. appl. Chem. 1950, **35**: 738-63, bibl. 250 [received 1952].

In a brief section on hop research reports from East Malling and Wye College are mentioned, and papers on new varieties, diseases and pests are noted.

2831. BEARD, F. H.
Seven clonal selections of Golding hops.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 189-96, bibl. 6.

A detailed account is given of trials over 6 years with 7 clonal Golding hops. The chief characters of each clone, including their relative freedom from downy mildew, are described, and Early Bird, Petham Golding and Eastwell Golding are recommended as early, mid-season and late varieties respectively.

2832. BLATTNÝ, C., AND OSVALD, V.
Některé souvislosti vyplývající ze stadijního vývoje chmelové rostliny (*Humulus lupulus* L.). **(Certain indications given by the form of the hop plant at various stages of its development.)** [French and Russian summaries ½ p. each.]
Sborn. čsl. Akad. Zeměd., 1951, **24**: 236-48, bibl. 5, illus.

In the development of the hop plant the leaf form changes from being undivided in the young plant to the typical deeply indented outline of the mature leaf. Excision of the terminal shoot and attack by virus cause retention of the undivided juvenile leaf form, and the characteristics by which the cause of this undivided leaf form can be ascertained are described.

2833. KEYWORTH, W. G., AND HARRIS, R. V.
Diseases of the hop: work at East Malling Research Station.
Nature, 1952, **169**: 644-5.

A brief review of the work on systemic hop diseases which cannot be controlled by spraying, viz. *Verticillium* wilt and the virus diseases mosaic and nettlehead. The establishment of nurseries outside the hop growing areas is considered necessary for the production of healthy planting stock, especially in the case of wilt-resistant varieties which do not show any symptoms but spread the disease. Provision is also needed for maintaining a small basic supply of healthy stocks of the commercial varieties and new seedlings from which such nurseries can periodically be restocked.

2834. YARWOOD, C. E.
Hop cankers.
Plant Dis. Reptr, 1951, **35**: 361-3, bibl. 5, illus.

From the general symptoms and the presence of *Fusarium* spores in the cankers the disease was originally diagnosed as hop canker caused by *Gibberella* sp. as described in England [*H.A.*, 9: 936]. The regular presence of a *Phytophthora* or *Pythium* (not identified) in the cankers make this diagnosis doubtful. On the basis of the location of the cankers, the foaming of the exudate and the nature and weak pathogenicity of the fungi associated with the cankers, the author believes that the hop canker described here resembles quite closely the foam disease of citrus [*H.A.*, 20: 1926]. In combination with watering, hilling was more effective in producing infection than was artificial injury.—University of California.

2835. BALDRATI, I.
Avertis, originale e gradevole ortaggio milanese. **(The hop as a popular vegetable in the Milan district.)**
Humus, 1951, **7**: 11: 14-15.

The author describes in a short note the use made of young shoots of hop (*Humulus lupulus*) growing wild in northern Italy, Germany and Belgium as an excellent vegetable sometimes known as wild asparagus. He also refers to publications by Schilling of Dresden dealing with the use of late autumn shoots for paper and fibre making. He suggests that for these purposes and for the more customary use for flavouring beer hop cultivation in Italy merits serious consideration.

Seed oils.

(*See also* 2849l.)

2836. STURKIE, D. G.
Experiments with oil crops.
Bull. Ala. agric. Exp. Stat. **277**, 1950, pp. 28, from abstr. in *Soils and Ferts*, 1952, **15**: 796.

Recommendations are made for the growing of castor

beans, flax, hemp, safflower, chia, perilla, sesame and sunflower as oil crops.

2837. KRISHNAMURTY, T. S.
Improved varieties of oilseeds—castor.
Indian Fmg, 1951, **1** (n.s.): 8: 18-20.
This article includes tabulated information on 22 new strains of castor bean raised in different Indian States, including details of average yields and oil contents.

2838. PATEL, M. K., KULKARNI, Y. S., AND DHANDE, G. W.
Bacterial leaf-spot of castor.
Curr. Sci., 1951, **20**: 20, bibl. 2.
A severe disease observed at Anand is described, which is similar to that reported from other countries as being caused by *Xanthomonas ricinicola*.

2839. MACLEAN, J. A. R.
Oil-bearing seeds of possible economic importance to West Africa.
Nature, 1952, **169**: 589-90, bibl. 4, illus.
An account, from the West African Cacao Research Institute, Gold Coast, of the botanical and chemical characteristics of seeds obtained from 3 species of *Herrania* (Sterculiaceae) introduced from the Amazon Valley. The oil content of seeds dried at 100° C. was found to be over 60%.

2840. ERWIN, D. C.
Phytophthora root rot of safflower.
Phytopathology, 1952, **42**: 32-5, bibl. 9.
A new root rot of safflower (*Carthamus tinctorius*) was found to be caused by *Phytophthora drechsleri*. Soil temperatures of 25° and 30° C. were most favourable for the development of the disease under greenhouse conditions; much less disease occurred at 20° and none at 17° C.—University of Nebraska.

2841. THOMAS, C. A.
The occurrence and pathogenicity of *Phytophthora* species which cause root rot of safflower.
Plant Dis. Reptr, 1951, **35**: 454-5, bibl. 4.
Root rot of safflower was observed in commercial fields in several Great Plains States, Arizona, California, and in experimental plots at Beltsville, Maryland. *Phytophthora drechsleri* is probably the chief organism involved in commercial areas, but *P. parasitica* is equally virulent and both fungi are more virulent than *P. cactorum*. One variety of safflower (N8) was resistant to all three organisms in greenhouse tests.—U.S. Div. of Tobacco, medicinal, and special crops.

2842. THOMAS, C. A.
Varietal susceptibility in safflower to phytophthora root rot.
From abstr. in *Phytopathology*, 1952, **42**: 21.
Marked differences in susceptibility to *Phytophthora drechsleri* have been noted in the field among present varieties, selections, and foreign introductions to California of *Carthamus tinctorius*. Varieties Nebraska 9, N852 and Indian are susceptible, N6 is intermediate, and N8, N5 and N4 are resistant.

2843. THOMAS, C. A.
Transmission of safflower rust on treated seed.
Phytopathology, 1952, **42**: 108-9, bibl. 3.
Approximately 100,000 acres of safflower, *Carthamus tinctorius*, were grown in the United States in 1950, and rust, *Puccinia carthami*, was among the more important diseases affecting the crop. This disease is probably unique among the rusts in that it is seed-borne. In seed treatments Parzate and Phygon XL gave complete control of hypocotyl infections without injury in a limited number of tests.—U.S. Dep. Agric. Beltsville, Maryland.

2844. WU, C. C., AND LI, L. Y.
The performance of the tea-oil plant, *Thea oleosa* in Kushan, Foochow. [Chinese with English summary ¾ p.]
Fukien agric. J., 1950, **11**: 109-18, bibl. 7, illus.
Thea oleosa is cultivated in S.E. China for its edible oil. Eight types were recognized in 2 plots of tea-oil plants planted at the Fukien Christian University in 1934. Physical and chemical characters of the 8 types are tabulated. Oil contents ranged from 11·24% to 39·52%.

Sundry crops.

2845. WALKER, ABBÉ A.
Une nouvelle légumineuse du Gabon servant à narcotiser le poisson. **(A new legume of Gabon used to stupify fish.)**
Rev. int. Bot. appl., 1951, **31**: 327.
A brief account is given of *Baphia nitida* Lodd., its uses and native names.

2846. KROCHMAL, A., AND PAUR, S.
Canaigre—a desert source of tannin.
Econ. Bot., 1951, **5**: 367-77, bibl. 22, illus.
A historical, botanical, chemical and agricultural review of *Rumex hymenosepalus*, which is native to the southwestern United States, is followed by a description of harvesting. The possibility of commercial production of tannin from canaigre is being studied.

2847. FLORENCHIE, —.
Notes sur les *Derris* du Jardin d'Essai. **(Notes on *Derris* spp. in the trial garden.)**
Rev. hort. Algér., 1951, **55**: 77-9.
In the Hamma trial garden, Algeria, *Derris elliptica* and *D. malaccensis* have been grown for comparison. The latter is the more shrubby plant and its total rotenone content lower, e.g. 5·6% compared with 7·7% for *D. elliptica*.

2848. BANIGAN, T. F., JR., MEEKS, J. W., AND PLANCK, R. W.
Distribution of waxes in guayule.
Bot. Gaz., 1951, **113**: 231-4, bibl. 3, illus.
It appears that guayule wax occurs almost exclusively in the phloem above the crown and in the actively growing parts of the shrub, where it probably protects these tissues from excessive dehydration during periods of moisture stress. Wax was also found in resinous guayule rubber to the extent of at least 0·5%. The wax distribution remains about constant for shrubs of the same age and variety harvested at different seasons. [From authors' summary.]—Bur. agric. industr. Chem. U.S.D.A.

Noted.

2849.

a BEROZA, M.
Alkaloids from *Tripterygium wilfordii* Book: wilforgine and wilfortrine.
J. Amer. chem. Soc., 1952, **74**: 1585-8, bibl. 12.

b CAMPBELL, T. N.
Medicinal plants used by Choctaw, Chickasaw, and Creek Indians in the early nineteenth century.
J. Wash. Acad. Sci., 1951, **41**: 285-90, bibl. 15.

c CARRA, P., AND AUGÉ, —.
Le guayule ***Parthenium argentatum.*** **(Guayule.)**
Rev. hort. Algér., 1951, **55**: 239-43; 294-9, bibl. 5.
A review of studies outside Algeria.

d CHATTERJEE, A., AND BOSE, S.
A new alkaloid from the root of *Rauwolfia serpentina* Benth.
Sci. and Cult., 1951, **17**: 139, bibl. 15.

e COOK, W. B., AND BEATH, O. A.
The alkaloids of *Delphinium barbeyi* H.
J. Amer. chem. Soc., 1952, **74**: 1411-15, bibl. 11, illus.
Lycoctonine and anthranoyllycoctonine.

f GEDEON, J.
Saponins from Indian soapnuts—*Sapindus mukorossi* Gaertn. and *Sapindus laurifolius* Vahl.
J. sci. industr. Res. India, 1952, **11B**: 84, bibl. 7.
Includes tabulated figures for saponins as found by several workers.

g GROHNE, U.
Untersuchungen zur Frage der Lichtkeimung von *Digitalis purpurea* L. **(The germination of *Digitalis purpurea* in light.)**
Biol. Zbl., 1952, **71**: 10-42, bibl. 22, illus.

h HAGEMAN, R. H.
Flowering induced on *Derris elliptica.*
Trop. Agriculture, Trin., 1950, **27**: 225-6, bibl. 4.
For an abstract based on a summary of this paper see *H.A.*, 21: 2821.

i HAGEMAN, R. H., AND PAGAN, C.
The effect of season on the propagation of derris and lonchocarpus.
Trop. Agriculture Trin., 1950, **27**: 223-4, bibl. 3.
For an abstract based on a summary of this paper see *H.A.*, 21: 2820.

j JADHAV, A. S.
The agave fibre industry.
Poona agric. Coll. Mag., 1951, **42**: 38-45.
In India.

k KLOHS, M. W., AND OTHERS.
Hypotensive alkaloids of *Veratrum eschscholtzii.*
J. Amer. chem. Soc., 1952, **74**: 1871, bibl. 4.

l NARAIN, A.
Mutants in castor oil plant.
Sci. and Cult., 1951, **6**: 484-5, bibl. 2, illus.
Three mutants that are breeding true are described.

m PAINE, J.
List of insects occurring on the hop.
A.R. East Malling Res. Stat. for 1951, 1952, **A35**, pp. 179-80.
In Kent and Sussex.

n R., W.D.
Kava (*Piper methysticum*, Forst.).
Colon. Plant Anim. Prod., 1951, **2**: 45-8, bibl. 9.
A review of its native uses, applications in medicine and composition.

o RAHMAN, S. M. A.
Observation on the diseases of tezpata *[Cinnamonum tamala].*
Curr. Sci., 1951, **20**: 135, bibl. 4.

p RAYMOND, W. D., AND SQUIRES, J. A.
Annatto seed from Nigeria.
Colon. Plant Anim. Prod., 1951, **2**: 114-17.

q SCHWARZE, P.
Zur Methodik der Kautschukbestimmung in Pflanzen. **(A method of rubber determination in plants.)**
Züchter, 1951, **21**: 109-10.
Particularly in kok-saghyz.

r WEST, T. F.
The active principles of pyrethrum flowers.
Pyreth. Post., 1951, **2**: 2: 16-22, bibl. 31.
A review of literature on their chemistry.

FLORICULTURE.

General.

(*See also* 2041, 2042, 2082, 2107, 2111, 3183, 3184, 3188.)

2850. THE TIMES.
Survey of gardening.
The Times Publishing Company Ltd., London, March 1952, pp. 16, 6d.
An excellent 6 pennyworth is here provided for the amateur gardener. Among subjects on which clear practical advice is given are weed killing; geranium culture; use of cloches; bog and water plants; the fuchsia; melon growing; asparagus; keeping fruit clean; labour saving devices.

2851. MUNN, M. T.
Flower seed germination.
Proc. int. Seed Testing Ass., 1951, **16**; 228-32.
The following among other subjects are briefly discussed: the effect of trace element deficiencies on seed yield and viability; the effect of climate, weather and method of drying on seed dormancy; the causes of abnormal germination.

2852. Johnston, J. W.
Move plants any time.
N.Y. Herald Tribune, 21 June, 1951, condensed in *Brooklyn bot. Gdn Rec.*, 1951, **7**: 232-4, illus.
By spraying the foliage with the proprietary plastic latex preparation Wilt-pruf to prevent wilting, it is stated that the transplanting of most ornamentals can be carried out in full leaf with little or no risk.

Annuals and herbaceous plants.

2853. Charon, —.
Les plantes grimpantes annuelles. (**Annual climbing plants.**)
Rev. hort. Algér., 1951, **55**: 209-12; 235-8.
This article consists of short descriptions, with cultural notes, of a number of ornamental climbing plants which may be grown in Algeria. The more unusual of these are *Tropaeolum lobbianum* (a hybrid nasturtium), *Lagenaria vulgaris* (the calabash and varieties), *Dolichos lablab*, *Luffa cylindrica*, *Ipomaea versicolor* and *I. purpurea*, *Momordica charantia* and *M. balsamina*, and *Thunbergia alata*.

2854. Jefferson, R. N.
Octamethyl pyrophosphoramide and a trialkyl thiophosphate for control of aphids on *Centaurea cyanus*.
J. econ. Ent., 1951, **44**: 1021-2, bibl. 1.
The experiment carried out on a commercial seed farm in California showed that excellent control of *Aphis helichrysi* on *Centaurea cyanus* can be obtained by either octamethyl pyrophosphoramide or trialkyl thiophosphate, applied at 2 lb. and 0·375 lb. per 100 gal. respectively, the latter being more effective in case of heavily infested maturing plants.

2855. Coste, —., and Gagnard, —.
Contribution à l'étude de la culture de l'oeillet en Algérie. (**Carnation growing in Algeria.**)
Rev. hort. Algér., 1951, **55**: 141-63, bibl. 5, illus.
Conditions favourable for carnation growing in Algeria are briefly discussed, and notes are given on propagation (with a table of percentage "takes" in cuttings of various varieties in the open air and in frames), preparation of the soil, and manuring, spacing, watering, pinching, supports, disbudding, and pests and their control. The chief characters of 31 varieties are set out, and 12 varieties are illustrated.

2856. Thomas, W. D., Jr., and Baker, R. R.
Root transmission of carnation mosaic virus.
From abstr. in *Phytopathology*, 1952, 42: 21.
In controlled experiments it was found that mosaic-free plants of *Dianthus barbutus* (Sweet William), planted in pots together with mosaic-infected carnation plants, developed mosaic symptoms within two months. The roots showed many natural grafts between the plants. Repeated tests in insect-proof cages showed that the carnation mosaic virus may be transmitted through roots.

2857. Nelson, K. S., and Laurie, A.
Studies on bacterial wilt of carnations.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 367-70, bibl. 12.
Plants of 3 carnation varieties were grown in gravel culture that had been inoculated with the bacterial wilt organism, *Pseudomonas caryophylli*. The plants were supplied with solutions in which 2 levels each of calcium and pH were combined to give 4 treatments. Though the varieties differed in susceptibility, in all cases high Ca-low pH treatment produced the fewest deaths and low Ca-high pH the most.—Ohio agric. Exp. Stat.

2858. Guba, E. F.
Breeding carnations for resistance to fusarium wilt.
From abstr. in *Phytopathology*, 1952, **42**: 112-13.
The reaction of numerous carnation varieties to wilt caused by *Fusarium dianthi* was determined by surveys, questionnaires and artificial infections. Selfing and crossing flowers of resistant types, and testing the progeny with the fungous inoculum have yielded numerous resistant seedlings in a variety of colours and types, and several of the new named varieties have been introduced to the trade.

2859. Camici, L.
Rhizoctonia solani Kühn e correlazioni tra fattori parassitari e non parassitari nel "deperimento dei garofani" della Riviera Ligure. (***Rhizoctonia solani* Kühn and the correlation of parasitic and non-parasitic factors in carnation wilt in the Ligurian Riviera.**) [English summary ½ p.]
Boll. Staz. Pat. veg. Roma, 1948 (issued 1950), **6**: 89-105, bibl. 22, illus.
Observations indicate that the wilting of carnations in the Ligurian Riviera [northern Italy] is caused by associated infection by *Rhizoctonia solani* and numerous strains of *Fusarium*. *R. solani*, the cause of collar rot, is chiefly responsible for the disease. The *Fusarium* strains, of which the most active and frequent appears to be *F. scirpi*, can have either a primary or a secondary action.

2860. Bosch, M.
Culture du chrysanthème en Afrique du Nord. (**Chrysanthemum growing in North Africa.**)
Rev. hort. Algér., 1951, **55**: 123-31, 182-7.
The cultivation of chrysanthemums in North Africa is described with reference to the factors influencing flowering, photoperiodicity, soils and fertilizers, planting, propagation, taking cuttings, pinching back, varieties, disbudding, physiological splitting of the buds, diseases and pests and their control.

2861. Rose, S., and Kiplinger, D. C.
Year around flowering of potted chrysanthemums.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 347-9.
Potted chrysanthemums of 3 varieties were subjected to: (1) no pinching [stopping], short day shading from the time of potting, (2) single pinching 2-3 weeks after potting and then short days, (3) double pinching, once 2-3 weeks after potting and then again 3-4 weeks later with short days from the second pinching, and (4) potting and pinching on the same day with short days started immediately. The treatments were repeated on new batches of plants each month for

6 to 9 months. For large specimen plants treatment 3 gave the best results; it also produced the most flowers. Treatment 4 gave the best shaped small specimen plants in the shortest time, and treatment 2 was in no way superior to it. Treatment 1 gave the smallest number of flowers. There were some seasonal differences between the varieties.—Ohio agric. Exp. Stat.

2862. Hickman, D. D., and Kamp, J. R.
The effects of some graded deficiencies of nitrogen and potassium on the evolution of carbon dioxide by the roots of greenhouse chrysanthemums.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 333-42, bibl. 8, illus.

Chrysanthemums were grown in 2 series of gravel nutrient cultures, one supplying adequate K and decreasing N and the other adequate N and decreasing K. The rate of respiration of CO_2 by the roots was measured, the apparatus used for the purpose being illustrated. CO_2 evolution decreased progressively with increased N deficiency and increased with increased K deficiency, both effects being statistically significant. The roots of N-deficient plants had a relatively high sugar content and relatively low total N, while those of K-deficient plants had a very high sugar content and normal N. Neither deficiency had much effect on the size or texture of the root systems, but both reduced the fresh and dry weights of the shoots and the dry weight of the roots.—Ill. agric. Exp. Stat.

2863. Brierley, P., and Smith, F. F.
Survey of virus diseases of chrysanthemums.
Plant Dis. Reptr, 1951, **35**: 524-6, bibl. 14.

The survey has shown that the following six virus diseases of chrysanthemums may now be distinguished in North America: tomato spotted wilt; aster yellows; chrysanthemum stunt; blanche mosaic or news mosaic; ivory seagull mosaic; and tomato aspermy.

2864. Pittman, H. A. J.
Leaf nematode disease in chrysanthemums.
J. Dep. Agric. Vict., 1952, **50**: 90-2, illus.

This disease caused by *Aphelenchoides ritzema-bosi* is described and the usual hot water control method described. Preliminary trials in which spraying the foliage of well-grown, heavily-infested plants with a 1 : 400 to 1 : 800 dilution (preferably 1 : 400) of parathion resulted in death of the nematodes and their eggs within existing lesions, without apparent damage to the plants, and no further extension of the disease took place. Three applications, starting mid-February, at fortnightly intervals, may be required to give complete control.

2865. Haun, J. R., and Cornell, P. W.
Rooting response of geranium (*Pelargonium hortorum*, Bailey var. Ricard) cuttings as influenced by nitrogen, phosphorus, and potassium nutrition of the stock plant.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 317-23, bibl. 21, being *Sci. Pap. Md agric. Exp. Stat.* (*Dep. Hort.*) A-303.

Cuttings were taken and planted from geraniums grown in sand culture at 3 levels each of N, P and K. The effects of level of N on composition and rooting were much more pronounced than those of P or K. The level of N significantly affected the composition of the plants in N, P, K, Ca and carbohydrates. Low and medium N gave significantly higher percentages of rooting in the cuttings than high N, but among the rooted cuttings the latter showed a significantly lower mortality than the others and developed more and longer roots. There was an indication that the highest percentages of rooted cuttings resulted from combinations of low N with high P and low or medium N with high K.

2866. Srivastava, H. C.
Damping-off in hollyhocks.
Sci. and Cult., 1951, **17**: 91-2, illus.

Three fungi, *Rhizoctonia solani*, *Sclerotium bataticola* and *Pythium debaryanum*, were found to be responsible for damping-off of hollyhock seedlings at Kanpur. Among seed treatments tested for its control Agrosan G gave the best results followed by Ceresan and copper oxychloride. Among soil treatments formaldehyde dust at 24 g. per sq. ft. was the best.

2867. Ohlander, M. C., and Watson, D. P.
Experimental storage of cut peony flowers.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 371-6, bibl. 8, illus., being *J. Art. Mich. agric. Exp. Stat.* **1237.**

Peonies of 3 varieties were treated with several fungicides, packed in waxed boxes which were sealed in cellophane and stored at 34-36° F. for 31 to 73 days. Felix Crousse stored better over the longer periods than Reine Hortense or Walter Faxon. In general, keeping qualities after removal from storage to room temperatures varied inversely with the length of storage. After 60 days storage and 4 days at room temperature 61% of Felix Crousse, 0% of Reine Hortense and 36% of Walter Faxon were in a saleable condition. Fungi isolated from the peonies were *Alternaria humicola* and *Fusarium* sp. Of the fungicides tested para-dichlorobenzene at 2 and 4 g. per 420 cu. in. of box controlled fungal growth for 73 days, but after 59 days caused severe foliage injury.

2868. Nilsson, A.
Diana W:s, Saba W:s och Freja W:s tre nya drivlövkojor av Brillianttyp. **(Diana W:s, Saba W:s and Freja W:s, three new stocks *[Matthiola incana]* of the Brilliant-type for forcing.)** [English and German summaries ¾ p. each.]
Agric. hort. Genet., 1951, **9**: 97-106, bibl. 3, illus.

The 3 varieties described are of primary importance for the Scandinavian countries, outside which the Brilliant-type stocks are hardly known.

2869. Jefferson, R. N., and Eads, C. O.
Control of aphids transmitting stock mosaic.
J. econ. Ent., 1951, **44**: 878-82, bibl. 5.

For the control of the stock mosaic virus vectors *Rhopalosiphum pseudobrassicae* and *Myzus persicae* in California parathion applied at the rate of 0·15 lb. wettable powder per 100 gal. was the most satisfactory of several insecticides tested. If, however, migrants are numerous, little or no control of mosaic may be obtained, as apparently none of the materials used acts rapidly enough to prevent infection.

2870. Wester, H. V.
Comparative growth response of Haarstick water lily to ammonium and nitrate nitrogen in 10-6-4 fertilizer as compared to cow manure.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 324-8, bibl. 6, illus.
In a trial on the water lily, *Nymphaea zenkeri* var. H. C. Haarstick, a 10-6-4 fertilizer containing ammonium sulphate supplied at 1 or 2 oz. per cu. ft. of soil was much superior as regards leaf area, flower size and flower production than the same combination containing nitrate of soda or than cow manure.—U.S. Dep. Interior, Washington, D.C.

2871. Kišpatić, J.
Pjegavost cinije (*Alternaria zinniae* Pape). **(An alternaria disease of zinnias.)** [English summary ½ p.]
Glasnik biol. Sek. Zagreb, 1948/49 (issued 1950), **2/3**: 29-38, bibl. 19.
The symptoms and factors affecting the development of *Alternaria zinniae* on zinnias are described, high humidity and temperatures between 22 and 26° C. being important favourable conditions. Dusting the seed with mercurial compounds is recommended as partially effective, soaking in 0·1% Ceretan for ½ hr., while giving better control, affected germination. Control in the field can be obtained with 2 or 3 spray applications of 1% bordeaux mixture combined with the destruction of infected plants.

Bulbs, tubers, etc.

(*See also* 2916b, j, l, 3173.)

2872. Valenta, V.
Nový rastlinný parazit—*Penicillium brevi-compactum.* **(A new plant parasite—*Penicillium brevi-compactum.*)** [English and Russian summaries 12 and 14 lines respectively.]
Sborn. čsl. Akad. Zeměd., 1951, **24**: 281-8, bibl. 10, illus.
Penicillium brevi-compactum was found attacking *Cyclamen persicum* and *Euphorbia pulcherrima* in a glasshouse near Bratislava in Slovakia. In cyclamen the fungus first invades the anthers and from there the mycelium grows into the ovaries, preventing seed formation. Flowers with distorted petals are primarily subject to the disease. In *Euphorbia* the nectaries represent an ideal substrate for fungal growth. For control the removal of imperfect flowers and glasshouse hygiene are recommended.

2873. Marini, E.
Segnalazione di virosi della dalia nelle culture di produzione in Italia. **(Virus diseases of dahlia in Italian nurseries.)** [English summary 3 lines.]
Not. Mal. Piante, 1951, No. 17, pp. 13-16, bibl. 11.
Observations suggest that the viruses responsible are dahlia virus 1, the spotted wilt lycopersicum virus 3, and the cucumis virus 1. Susceptible varieties are listed. Control measures suggested are propagation from disease-free plants and fumigation of the greenhouses to keep down aphids.

2874. White, H. E.
Influence of temperature and storage treatments on forcing of freesias.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 343-6, being *Contr. Mass. agric. Exp. Stat.* **801**.
Freesia corms of 4 varieties stored for 2 to 8 weeks at 60-75° F. before planting lost 2 to 21% of their original weight during storage. The number of days from planting to flowering was shorter for stored corms than for corms planted immediately, though the reduction in time was not uniformly proportional to the length of storage. Corms stored for more than 3 to 4 weeks at a warm temperature started to sprout. Corms stored for 2 to 4 weeks at 42-45° F. did not flower earlier than corms stored at 60-75° F., but when they were grown at 62-65° F. they flowered 30 to 40 days earlier than when grown at 52-55° F.

2875. Bald, J. G.
Short flower spikes on gladioli due to defective root systems.
Plant Dis. Reptr, 1951, **35**: 506.
In a disorder of gladiolus plants in South Carolina causing many unsaleable flowers, the spikes were short, sometimes barely taller than the leaves, and often the flowers failed to open properly. The shoots had a normal appearance but were sometimes slightly stunted. On such plants very few roots emerged from the parent corms and few or none from the new corms. No recognized pathogens were present on affected plants. The condition may be prevented by proper curing of corms dug in the colder period of the year. A temperature of 95° F. with humidity around 80% is suggested.—Univ. of Calif., Los Angeles.

2876. Bald, J. G.
Stomatal droplets and the penetration of leaves by plant pathogens.
Amer. J. Bot., 1952, **39**: 97-9, bibl. 9.
Observations and experiments with gladioli in the semi-arid climate of California showed that drops of water may be exuded through the stomata of the leaves when the atmosphere is cool and humid and the soil warm and moist. Stomatal droplets induce the germ tubes of leaf-invading fungi to pass into the stomata and infect the leaf. As the air temperature rises and humidity decreases, the drops may be retracted and draw bacteria from the leaf surface into substomatal cavities and intercellular spaces.—Univ. Calif., Los Angeles.

2877. Holloman, A., Jr., and Young, R. A.
Evaluation of fungicides for control of the leaf-spot disease of gladiolus caused by *Botrytis gladiolorum* Timmermans.
Plant Dis. Reptr, 1951, **35**: 456-8, bibl. 2.
Both ferbam and nabam gave economic control of gladiolus leaf spot (*Botrytis gladiolorum*) under Oregon conditions. Although ferbam was most effective in controlling the disease it has the undesirable property of leaving a conspicuous black residue on foliage and flowers. For this reason it is recommended to those growers who cultivate for corm production only and nabam for use when cut flowers are to be sold.—Ore. agric. Exp. Stat.

2878. ANON.
Gladiolus yellows in N.S.W.
Agric. Gaz. N.S.W., 1952, **63**: 85-7, illus.

During the past season fusarium yellows (*F. orthoceras* var. *gladioli*) has been detected in 3 localities in New South Wales. It is almost impossible to detect the disease in stored corms by external examination only. The symptoms and conditions favouring the disease are mentioned. Control measures recommended in the United States are given, viz. soak corms 2 hr. in 0·1% corrosive sublimate, then dip for 1 min. in calomel suspension (1 lb. to 4 gal.), and plant early. Three of the varieties found to be affected in New South Wales, Ethel Cave Cole, Leading Lady and Beacon, are classified as resistant in America.

2879. ROBERTSON, N.
Further investigations of the "fusarium yellows" disease of gladiolus.
[*Publ.*] *Brit. Gladiolus Soc.* [1952?], pp. 7.

Some general conclusions from the work to date are: (1) Infection of gladioli by a fusarium capable of causing yellowing and death of the plants is widespread in Britain; varieties in which the disease has been confirmed include Wedgewood, Tristan, Cherbourg, Polynese, Agitato and Henri Dumant. (2) The symptoms observed in the field were relatively mild and inconspicuous, whereas in the greenhouse infected varieties may show very severe symptoms. (3) Stocks of varieties with corms which look healthy can carry the disease. (4) Growers starting with healthy stock on clean ground should rogue out any yellowed plants and practise rotation. (5) Some varieties are resistant to the disease and should be grown in preference to susceptible varieties.—Botany School, Cambridge.

2880. GOULD, C. J.
New developments in disease control.
Gladiol. Mag., 1950, **14**: 1: 41-4, from abstr. in *Rev. appl. Mycol.*, 1952, **31**: 119-20.

Gladiolus rot due to *Fusarium* [*oxysporum f. gladioli*] can be controlled by post-harvest dips in spergon, dowicide A, or dowicide B for bruised or heavily infected stock, by pre-storage dusts (dow 9B, ferradow or fermate, and DDT mixture, and spergon and DDT), and by preplanting treatments, including dowicide 9B, ceresan, lysol, spergon, tersan, and arasan. Dry rot [*Sclerotinia gladioli*] is controlled fairly well by puraturf 177, tersan, arasan, ceresan, lysol and supergermite. Spread of mosaic can be reduced by isolating new stocks, growing gladiolus away from freesias and legumes, and controlling aphids.

2881. ANON.
Gladiolus dry rot—a disease transmitted through the corm.
Agric. Gaz. N.S.W., 1952, **63**: 17-18, illus.

A dry rot of gladiolus corms, caused by *Sclerotinia gladioli*, is seen on the stored corms as small, dark, more or less superficial spots or lesions. It can also produce a collar rot which kills the growing plant, or, if the attack is delayed, the new corm only will be affected, thus enabling the fungus to carry over to the next season. Heavily infected corms should be burned. For slightly to moderately affected corms the following is recommended: Soak corms for 48 hours in phenylmercuryacetate, 1 part of 2% emulsion to 100 parts of water, or dip in calomel 1 lb./4 gal. for 5-10 min.

2882. RICHARDSON, H. H., AND SPRUYT, F. J.
Quarantine treatments to control golden nematode cysts adhering to lily-of-the-valley pips: progress report with special reference to plant tolerance.
Plant Dis. Reptr, 1951, **35**: 519-21, bibl. 4, illus.

The following hot water treatment has been used at the Plant Inspection House at Hoboken, N.J. The pips, imported under refrigeration, are thawed for about one day in summer or for 1 to 2 days in winter. The bunches are separated from the sphagnum moss and packed rather closely into wire-mesh baskets. The water is maintained at 118° F. After 30 min. immersion the pips are drained for 5 min. then hosed or dipped for 5 min. in water at 50° F. to 60° F., before being repacked. The boxes and sphagnum moss are treated separately by steam sterilization. The pips should be planted within 3 or 4 days or else the sprouts will be injured in the tightly packed boxes. Forcing beds should be kept near 65° to 70° F. Refreezing and storage of pips after hot-water treatment has caused considerable injury. [See also abstract 2736.]

2883. JENSEN, H. J., ANDERSON, C. G., AND WIEMAN, J.
A root-lesion nematode disease of narcissus.
Plant Dis. Reptr, 1951, **35**: 522-3, bibl. 4, illus.

Premature yellowing, falling and withering of foliage observed in spring and early summer in fields of King Alfred daffodils in Oregon have been associated with the presence of an apparently undescribed nematode *Pratylenchus* sp. The fungus *Cylindrocarpon* sp. was also recovered from the roots of diseased plants. A similar disease, occurring in Holland since 1917, has been associated with various nematodes including *Tylenchus pratensis* and with the fungi *Cylindrocarpon radicicola* and *Fusarium* sp. Investigations on control are in progress.

Cacti and succulents.

(*See also* 2828.)

2884. MEGATA, M.
An account of the genus *Astrophytum* Lemaire.
Mem. Coll. Agric. Kyoto Univ. 56 (*hort. Ser.* 2), 1944, pp. 62, bibl. 84, illus. [received 1951].

Following a historical introduction and notes on variations and modifications in species of *Astrophytum*, the production of abnormalities and differences in the cultural needs of ornamental species, the author describes his and other workers' cytogenetical studies and finally gives taxonomic descriptions of 5 species with their sub species and suggests their separation into 2 sections, *Austrastrophytum* and *Septentriastrophytum*.

2885. CHEVALIER, A.
Sur quelques Aloë's de la zone guinéenne de l'Afrique vivant de 300 m. à 850 m. d'altitude. **(On certain species of *Aloe* of the Guinea zone of Africa growing at altitudes of 300 to 850 metres.)**
Rev. int. Bot. appl., 1951, **31**: 591-8, illus.

This article includes notes on *Aloe edulis*, *A. barteri*

varieties *sudanica* and *dahomensis*, *A. trivialis* and its variety *lutea*, and *A. paludicola*.

Lawns.

2886. BUTTERFIELD, H. M., SCHOONOVER, W., AND SHEPHERD, H. W.
Lawn planting and care.
Circ. Calif. agric. Ext. Serv. **181**, 1951, pp. 38, illus.

This manual should be of interest to anyone wishing to establish or maintain a lawn under semi-arid conditions comparable with those of California. Among the subjects dealt with are landscape planning, preparing the seedbed, sprinkler irrigation, grass species and varieties, seed selection, fungicidal seed treatment, planting by seed, turfs or sprigs (stolons), maintenance with information on types of mower and other tools, the control of diseases, pests and weeds including the use of herbicides, renovation and estimates of certain costs.

2887. DESHMUKH, G. B.
A new lawn grass for lawns in Bombay State.
Poona agric. Coll. Mag., 1951, **42**: 98.

Zoysia pungens, which has not yet been fully tested, is proposed as an alternative to the commonly used *Cynodon dactylon*. It is said to bleach less, suppress weeds better, grow well in damp places and form a good turf.

2888. GRAU, F. V.
This is Meyer (Z-52) zoysia.
Seed World, 1952, **70**: 4: 14, 16, illus.

Among the numerous advantages claimed for this new improved turf grass are: resistance to heat, wear, summer weeds, and insect damage; pleasing appearance; and less frequent mowing than most turf grasses. Meyer zoysia's main disadvantages include the need for vegetative propagation, relatively slow spread and a complete dormant season during which winter weeds invade the turf.—U.S. Golf Ass., Plant Industry Station, Beltsville, Md.

2889. FLENTJE, N. T., AND JEFFERY, M. W.
A note on some slime moulds from South Australia.
J. Dep. Agric. S. Aust., 1952, **55**: 297-300, illus.

This note is concerned chiefly with the slime moulds sometimes found on pastures, golf courses and lawns, but one slime mould, *Diachia leucopoda*, has been found on strawberry plants, on which it formed a whitish incrustation carrying thousands of small cylindrical purplish heads; these covered the leaves and stems. Bordeaux mixture has been reported to be effective in the control of slime moulds on growing plants.

Orchids.

2890. VEYRENC, H.
Petites fleurs étranges *Orchis* et *Ophrys* algériens. Comment les cultiver. **(Unusual little flowers. Algerian species of *Orchis* and *Ophrys* and their cultivation.)**
Rev. hort. Algér., 1950, **54**: 279-89, illus.

The natural wild flora of North Africa includes more than 30 orchid species. These are not specifically North African plants but are found over a large part of the Mediterranean Zone. Some of these orchids which are worth cultivating are briefly described with notes on containers, planting, manuring, watering, and pests (slugs and snails, and black aphids).

2891. VEYRENC, —.
Multiplication des dendrobium par marcottage. **(Propagating dendrobium by marcotting.)**
Rev. hort. Algér., 1951, **55**: 74-6, illus.

Certain species of dendrobium develop shoots in the form of runners which can be trained through the side of a lattice basket with the terminal bud projecting at the top. The basket is then filled with compost consisting of chopped polypodium fronds and sphagnum moss, so that the pH is 6·5. If possible, the compost should be infested with *Rhizoctonia repens*, one of the fungi which live in symbiosis with the orchid roots. An incision should be made under the shoot to about $\frac{1}{3}$ of its diameter before placing it in the basket; later the cut is made to $\frac{2}{3}$ the diameter, and finally, when the bud had developed a few leaves, the cut can be completed so as to sever the young plant from the parent. The best results are obtained when the operation is carried out during the latter half of March.

2892. JENSEN, D. D.
Virus diseases of orchids.
Calif. Agric., 1952, **6**: 1: 3, 15, illus.

The symptoms of cattleya flower breaking, caused by 2 viruses and of cymbidium mosaic are described. Other genera known to be affected are mentioned. The main aspects of control are the use of seedlings or clean propagation stock, the destruction or isolation of diseased plants and protection against aphid vectors.

2893. NEWTON, N., AND ROSBERG, D. W.
Electron-microscope studies of a new orchid virus complex.
Phytopathology, 1952, **42**: 79-82, bibl. 5, illus.

From the results described it is concluded that the electron microscope is an excellent instrument for the rapid diagnosis of plant viruses.—Battelle Memorial Institute, Columbus, Ohio.

Roses.

2894. STRYDOM, J. C.
Roses. I. Rose types. II. Preparation of the soil, and planting time. III. Winter pruning of roses.
Fmg S. Afr., 1951, **26**: 347-50, illus., 1952, **27**: 29-32, illus., and 52-8, 67, illus.

Part I describes the classification of roses, their propagation by budding, mainly on *Rosa multiflora*, the choice of sites, and soil acidity, the best range for which is pH 5·8 to 6·5. Part II describes planting, manuring, watering, disbudding, cutting the blooms, and the summer pruning of ramblers and climbers. Part III discusses the best time for winter pruning and describes the methods applicable to the different types of rose, and lists, according to their groups, a large number of varieties with notes on their flower colour; notes on diseases and pests of roses and their control are also supplied by E. E. Schaefer and E. E. Anderssen respectively.

2895. WULFF, H. D.
Rosa kordesii, eine neue amphidiploide Rose. (***Rosa kordesii*, a new amphidiploid rose.**)
Züchter, 1951, **21**: 123-32, bibl. 14, illus.
Morphological and cytological descriptions are given of this amphidiploid rose (*R. rugosa* × *R. wichuraiana*).

2896. CARRIER, L. E.
A study of methods of determining the extent of frost injury of roses.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 350-6, bibl. 16.
1. Multiflora rose stems and roots were observed to reduce the vital stain 2,3,5-triphenyltetrazolium chloride when alive and failed to reduce it when dead. The sensitivity of this stain was found to be too low to be of use in determining the degree of injury caused by the freezing treatments. 2. An estimate of injury sustained by rose canes and roots after freezing treatments was obtained by soaking sections of the treated materials in distilled water and determining the specific conductance of the resulting liquid. 3. Survival of a rose tissue following freezing treatments was determined by observations of growth and injury after storage of the tissue. 4. The measurement of specific conductance of electrolytes lost from frost treated tissue when used in conjunction with observation of injury after storage was a more reliable estimate of frost injury than either method used alone. [Author's summary.]

2897. ENTOMOLOGICAL BRANCH, DEPARTMENT OF AGRICULTURE, N.S.W.
The white rose scale (*Aulacaspis rosae*).
Agric. Gaz. N.S.W., 1952, **63**: 38-9, illus.
The white rose scale, primarily a pest of roses, also infests raspberries, loganberries, and blackberries. It usually attacks the stems and branches, and it is only where heavy and prolonged infestation occurs that the younger growth is attacked. Its life-cycle is outlined. Several overlapping generations may develop during the year. It may be controlled by spraying with a white oil emulsion diluted at the rate of 4 fl. oz. to 1 gal. water (1 in 40); a second application may be necessary about six weeks after the first. Spraying is best carried out during the period of greatest dormancy of the plants. If the infestation is heavy the bushes should be cut back before spraying and the infested prunings should be burned.

Other trees and shrubs.

(*See also* 2916e, g, h, k, 3174, 3177.)

2898. ANON.
Conifers for garden and parklands.
Agric. Gaz. N.S.W., 1952, **63**: 82-4.
An account of the natural distribution of conifers is given, and those grown in New South Wales or suitable for growing in the State as ornamental trees are briefly described.

2899. WYMAN, D.
Air layering with polythene film.
J. roy. hort. Soc., 1952, **77**: 135-40, illus.
Many species of ornamentals air-layered [marcotted] in the Arnold Arboretum during the spring and summer of 1950 and 1951 are listed. The method and materials used were similar to those described earlier [see *H.A.*, 20: 3091 and 21: 922]. The polythene used was 0·004 in. thick Dura-Clear film (manufactured in the U.K. by I.C.I. under the trade name Alkathene). Difficulties were experienced in removing and establishing some of the rooted plants.

2900. CHADWICK, L. C., MILLER, R. R., AND ERSKINE, D.
The prevention of fruit formation on some ornamental trees.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 308-12, bibl. 1.
The results of tests made in Ohio with 25 spray materials on a number of species are summarized. α-naphthaleneacetic acid and related compounds were generally the most successful in preventing fruit set on trees carrying foliage at the time of full bloom, but they were not successful with all species. Other compounds that were successful in certain cases were n-1-naphthalphthalamic acid, maleic hydrazide, and, on certain trees that flower before producing foliage, several dinitro compounds.

2901. PRIDHAM, A. M. S., AND STANGLER, B. B.
Response of woody ornamentals to 2,4-D.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 313-16, bibl. 5.
In trials at Cornell University 2,4-D as the triethanolamine and sodium salts was applied in different concentrations and at different seasons to a number of tree and shrub species and to the soil around them. Injuries were common during the season of active growth and delayed injury also occurred when mature foliage was sprayed, this injury appearing as soon as growth was renewed. With September applications in low amounts applied at low pressure delayed injuries were minimized, while with single applications after leaf fall they were virtually eliminated. The amounts of 2,4-D needed to control many weeds in applications to the soil had no serious effect on tree growth.

2902. GESELL, S. G.
Insect pests of evergreens and their control.
Circ. Pa agric. Ext. Serv. **391**, 1951, pp. 19, illus.
The plants are listed alphabetically. The insects attacking them and recommended control measures are discussed individually under each host plant.

2903. SCHREAD, J. C.
Control of the strawberry root weevil and black vine weevil in nursery planting.
Circ. Conn. agric. Exp. Stat. **174**, revised 1951, pp. 8.
The strawberry root weevil, *Brachyrhinus ovatus*, and the black vine weevil, *B. sulcatus*, are frequently serious pests in conifer nurseries, and specimen trees in ornamental plantings or settings are also seriously injured at times. The application of chlordane or BHC is recommended for their control.

2904. CHOPINET, R.
Acacias introduits et cultivés dans les jardins méditerranéens. **(Acacias grown in the Mediterranean gardens of France.)** [English summary ¾ p.)
Ann. Amél. Plantes, 1951, **1**: 560-622, bibl. 97, illus.

Following introductory notes descriptions are given of 63 *Acacia* species belonging to 3 groups (Bipinnatae, Phyllodinae, Mixtae) for each of which an identification key is provided.

2905. Cole, J. R.
Control of tar spot of holly (*Ilex*) by spraying in South Georgia.
Plant Dis. Reptr, 1951, **35**: 408.

In addition to sanitary measures the tar spot of holly (*Phacidium curtisii*) can be controlled by either bordeaux mixture alone or bordeaux mixture followed by Phygon XL. As bordeaux mixture leaves an objectionable deposit when applied late in the season the latter programme is preferable. It is thought that Phygon XL would probably prove satisfactory for all applications.

2906. Sibilia, C.
Un probabile mosaico della sulla (*Hedysarum coronarium* L.). (**A probable mosaic disease of the French honeysuckle.**) [English summary 3 lines.]
Boll. Staz. Pat. veg. Roma, 1948 (issued 1950), **6**: 175-6, bibl. 1.

A probable mosaic of the French honeysuckle, *Hedysarum coronarium*, causes small light-green spots mostly between the veins of the leaflets giving a somewhat marbled appearance; in some cases this mosaic is accompanied by blistering. The disease, observed in the Marche region only, is of the broad bean mosaic type, already found in Italy.

2907. Lihnell, D.
Några värdväxter för *Cucumis-virus* 1 i Sverige. (**Some host plants of cucumber virus 1 in Sweden.**)
Växtskyddsnotiser, 1951, No. 4, pp. 52-6, illus.

The following plants were found to be infected with cucumber virus 1: *Bunias orientalis*, Dutchman's pipe (*Aristolochia durior*), honeysuckle (*Lonicera periclymenum*), spinach and tomato.

2908. Shanks, J. B., and Link, C. B.
Additional experiments on the mineral nutrition of hydrangeas.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 329-32, bibl. 3, being *Sci. Pap. Md agric. Exp. Stat.* (*Dep. Hort.*) **A304**.

An earlier paper [*H.A.*, 21: 3904] described an experiment in which NPK was applied at different levels to hydrangeas during the forcing period. The present paper reports the results of 2 further trials, one with the variety Gertrude Glahn during the growing period and the other with Merveille and Europa during the forcing period. In the first reduced light intensity, obtained by shading with a cloth early in the season, increased the number of flowering shoots per plant, but this effect was largely nullified when N (as ammonium sulphate) was applied and was reversed by high applications of P; K had no effect. In the second N+K applied during the forcing period produced larger inflorescences than N alone, though the latter resulted in pinker flowers; high P, while also aiding the production of pink flowers, reduced the amount of growth, particularly in the variety Europa; of the 5 treatments tested a 20-10-20 commercial fertilizer gave the best combination of growth and flower colour.

2909. Shanks, J. B., and Link, C. B.
Some studies on the effects of temperature and photoperiod on growth and flower formation in hydrangea.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 357-66, bibl. 8, being *Sci. Pap. Md agric. Exp. Stat.* (*Dep. Hort.*) **A312**.

Four experiments are described in which several varieties were used: (1) The effect of dark storage for 0 to 48 days at 42-45° F. on subsequent growth, (2) a study on the time of floral induction, and (3) and (4) two studies on the relation between temperature and photoperiod. The results, which are presented in detail, indicate that temperature affects vegetative growth, dormancy and reproductive growth and that photoperiod possibly affects these same phases to a limited degree.

2910. Allman, S. L.
Hydrangea scale prevalent.
Agric. Gaz. N.S.W., 1952, **63**: 84.

Hydrangea scale, *Pulvinaria* sp., is reported as prevalent in the Sydney suburbs. The recommended spring application is a white oil 8 fl. oz., nicotine sulphate 1 fl. oz. mixture in 4 gal. water. A second application made 3-4 weeks after the first would probably control late-hatching crawlers. Winter oil 1 in 40 would be effective at the over-wintering stage.

2911. Mahmud, K. A., and Jain, A. C.
Damping off of *Ipomoea pulchella* Roth. due to *Pythium aphanidermatum* (Eds.) Fitz.
Sci. and Cult., 1951, **16**: 526.

A note on *Pythium aphanidermatum*, identified as responsible for the death of morning glory seedlings in a nursery at Nagpur.

2912. Chadwick, L. C.
The influence of several understocks on the growth of scions of some varieties of *Juniperus*.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 301-7, bibl. 1.

Three varieties of *Juniperus virginiana*, Burk, Canaert and Hill Dundee, and 2 of *J. chinensis*, Columnaris and Keteleer, were grafted in 1942-43 on 6 rootstocks, *J. virginiana*, *J. chinensis*, *J. communis hibernica*, *J. excelsa stricta*, *J. horizontalis plumosa* and *Thuja orientalis*. Growth and survival records in 1947 and 1949 indicated *J. virginiana* to be the best stock, *J. chinensis* to be satisfactory, and *J. horizontalis plumosa* to be a suitable dwarfing stock for some of the larger juniper varieties. The other 3 stocks were inferior. Heavy, coarse roots produced by the scions as well as the stocks favoured the growth of the plants. —Ohio agric. Exp. Stat.

2913. Keen, R. A.
Cutting grafts of juniper: A progress report.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 298-300, bibl. 5, illus., being *Contr. Dep. Hort. Kans. St. Coll.* **231**.

Twenty-five unrooted cuttings of *Juniperus glauca* var. *hetzii* were used as stocks for bark grafting *J. virginiana* clone Burk, and 50 cuttings of *J. horizontalis plumosa* as stocks for *J. virginiana* clone Koster. The grafts were made in January. The cuttings after being

dipped in Hormodin No. 1 were set in coarse vermiculite kept at 68° F. and moistened by atomizing nozzles supplemented by hand watering. At potting time in mid-April 17 plants of the first combination and 32 of the second had both united and rooted. When established in pots the tops of the stocks were removed.

2914. BRIERLEY, P.
A witches' broom of lilac.
Plant Dis. Reptr, 1951, **35**: 556, illus.
In this disease, recorded for Maryland, on Japanese lilac (*Syringa* sp.) the symptoms are typical brooming, the lateral buds giving rise to 2 to 6 slender shoots which branch freely and bear small leaves, one-fourth the length of normal ones or even less. Brooms occupy most of the top of the plant, but a few lateral branches are free from them. No disease of this type is at present on record. The symptoms suggest the cause to be a virus, but as yet there is no proof.—U.S. Dep. Agric., Beltsville, Maryland.

2915. MILLER, P. R., AND O'BRIEN, M. J.
An apparently new sweet gum disease in Maryland.
Plant Dis. Reptr, 1951, **35**: 295-7, illus.
What appears to be a new disease of sweet gum, *Liquidambar styraciflua*, is characterized by a dieback, starting at the small branch tips and proceeding toward the main trunk. The leaves on diseased branches are usually abnormally small and become pigmented with anthocyanin by midsummer, when they are shed prematurely. In the next year the foliage tends to appear in bunches near the trunk and by midsummer the affected trees are dead. The cause of the disease is unknown but there is reason to believe that a virus is responsible.

Noted.

2916.

a BERGMANS, J.
Varens voor de tuin. **(Ferns for the garden.)**
Cult. Hand., 1952, **18**: 157-9, illus.

b BRIDGMON, G. H., AND WALKER, J. C.
Gladiolus as a virus reservoir.
Phytopathology, 1952, **42**: 65-70, bibl. 23, illus.
The full paper. For abstract see *H.A.*, 21: 2863.

c FABRICATORE, J. A.
Colletotrichum mahoniae n. sp. parassita su foglie di *Mahonia aquifolium*. **(*Colletotrichum mahoniae*, a leaf parasite of mahonia.)**
[English summary 3 lines.]
Boll. Staz. Pat. veg. Roma, 1948 (issued 1950), **6**: 133-9, bibl. 7, illus.

d GESELL, S. G., AND ADAMS, L. E.
Greenhouse insects and their control.
Circ. Pa agric. Ext. Serv. **395**, 1951, pp. 26, illus.
On flower crops in Pennsylvania.

e GUALACCINI, F.
" Mal bianco " del lillà (*Syringa vulgaris* L.). **(Powdery mildew of lilac.)** [English summary 3½ lines.]
Boll. Staz. Pat. veg. Roma, 1949 (issued 1951), **7**: 199-203, bibl. 5.

f JACQUES, J.-E.
Les ennemis des plantes d'appartement—II. **(Diseases and pests of house plants—II.)**
Agriculture, Quebec, 1950, **7**: 361-74, bibl. 35, illus.

g KLINKOWSKI, M., AND NOLTE, H.-W.
Knospenwickler als Schädlinge der Eberesche. **(Tortrix moths as pests of mountain ash.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1951, **5**: 212-13, bibl. 2, illus.
Argyroploce variegana and *Tmetocera ocellana*.

h KNIGHT, F. P.
Unusual and ornamental plants for hedges.
J. roy. hort. Soc., 1952, **77**: 151-6, illus.

i MAZON, H.
La désinfection des sols en cultures florales. **(The disinfection of the soil in flower growing.)**
Rev. hort. Algér., 1951, **55**: 120-1.
DD fumigation against eelworms attacking carnations, etc.

j RAO, A. N., AND RAJU, M. V. S.
Leaf bulbils in *Scilla indica* Baker.
Sci. and Cult., 1951, **16**: 373, bibl. 1, illus.
Formed at the leaf tips.

k SCHMIDT, T.
Epidemieartiges Auftreten von *Oidium syringae* in Österreich. **(Epidemic like outbreak of *Oidium syringae* in Austria.)**
PflSch. Ber. Wien, 1952, **8**: 22, bibl. 1.
On lilac [see also *H.A.*, 21: 3906].

l STEVENSON, V.
An easy way of bunching tulips.
Grower, 1952, **37**: 809, illus.

m VICKERY, H. B.
The behaviour of isocitric acid in excised leaves of *Bryophyllum calycinum* during culture in alternating light and darkness.
Plant Physiol., 1952, **27**: 9-17, bibl. 8.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 2279, 3190, 3228-3230.)

2917. CARRA, P.
Les arbres fruitiers exotiques. **(Exotic fruit trees.)**
Rev. hort. Algér., 1951, **55**: 178-81, 205-8, 228-34, 284-7.
An account is given of introduced fruit trees which have become acclimatized in Algeria. Their characters are described, together with notes on origin, biology, propagation and planting, and they are listed according to three different regions in which they thrive. (1) Species which succeed almost throughout the whole country: *Feijoa sellowiana*, *Myrtus* (*Eugenia*) *ugni*. (2) Species which may be grown in the orange zone:

Annona cherimola, Cyphomandra betacea, Eugenia jambolana. (3) Species which succeed only in more sheltered parts of the coastal region: *Eugenia jambos, E. michelii, Monstera deliciosa, Passiflora quadrangularis, Persea americana, Psidium guajava, Carica papaya, Musa sapientum* var. Hamma.

2918. Rebour, H.
L'arboriculture fruitière en Algérie. (Tree fruit cultivation in Algeria.)
Rev. hort. Algér., 1951, **55**: 269-83, illus.
The cultivation of tree fruits in Algeria is discussed with regard to climate, rainfall and irrigation, soils, and the inhabitants of the country. Citrus, olive, fig, and date are the main species, and smaller, but important areas are also planted in almond, apricot, carob, grapevine, and Japanese plum. Tables are given showing: 1. the species grown in different districts, number of trees, production, and exports, and 2. the chief species arranged according to 6 regions, viz. coastal, sublittoral, northern slopes of the Atlas Mountains, the high plateaux, the subdesert, and the Sahara.

2919. Chou, C. Y., and Li, L. Y.
A preliminary study of eleven edible wild fruits in Kushan, Foochow. [Chinese, with English summary ½ p.]
Fukien agric. J., 1950, **11**: 119-24, bibl. 2.
Brief descriptions are given of the following 11 wild fruits used in Foochow for food or medicinal purposes: *Elaeagnus pungens, Rosa bracteata, R. laevigata, R. microcarpa, Rubus corhorifolius, Melothria heterophylla, Rhodomyrtus tomentosa, Fortunella hindsii, Ficus pumila, F. beechiana,* and *Vaccinium bracteatum.* A table shows average weights, percentages of skin, flesh and seeds, reducing, invert and total sugars, acidity and ascorbic acid.

2920. Muhammad, I.
Fruit map of Egypt.
Punjab Fruit J., 1951, **15**: 51: 15-17, map.
Notes are given on the organization of the Horticultural Department, 8 experiment stations or plantations and the main fruit regions. The main varieties of date, banana and grape are mentioned. Other fruits grown include figs, olives and a seedless guava.

2921. Musahib-ud-Din, and Khan, M. A.
Varieties of fruit tried or under trial and varieties successful at the Experimental Garden Square No. 9, Punjab Agricultural College and Research Institute, Lyallpur.
Punjab Fruit J., 1951, **15**: 51: 34-6.
Fruit varieties under trial at Lyallpur are listed and those considered successful indicated. They are: Malta [sweet] orange, 53 (5 successful); sangtra [mandarin], 52 (4); grapefruit, 14 (3); limes and lemons, 15 (3); sweet lime, 2 (2); ber, 7 (2); mango, 32 (3); date, 12 (2); grape, 117 (5); banana, 80 (nil); olive, 11 (nil); and falsa unnamed and successful.

2922. Rebour, H.
Les cultures fruitières sahariennes autres que le dattier. (The cultivation of fruits other than dates in the Sahara.)
Bull. Inf. Otus. 1950, **38**: 1: 105-11.
Production is for local consumption as the technique of drying fruit for export has not been tried on the oases. Short notes are given on the following: apricot, fig, table grapes, prune and Japanese plums, olive, pistachio, quince, grenadine, carob, jujube and citrus fruits.

2923. Oppenheimer, H. R.
Summer drought and water balance of plants growing in the Near East.
J. Ecol., 1951, **39**: 356-62, bibl. 31.
The main results of work initiated in Palestine more than 20 years ago are reviewed. Early work by the present author showed the great diversity of physiological types existing among Mediterranean trees and bushes. Thus deciduous trees such as the almond and fig were found to be spendthrifts of water, whereas sclerophyllous evergreens and conifers such as the olive, laurel, carob, *Arbutus andrachne*, and the Aleppo pine were found to use water very economically. In considering how plants manage to balance their water budget he distinguishes (1) types which enjoy conditions of water supply which render economy relatively unimportant such as plants whose roots go down to a permanent ground water-table, e.g. *Prosopis farcata*, the rhizomes of which were found to penetrate to 15 m. in the Dead Sea desert, and (2) types which do not enjoy or are unable to exploit such a supply of moisture and must restrict their water budget drastically under unfavourable conditions.
Further he discusses observations made on the transpiration of plants in hot semi-arid conditions and quotes some surprising and exceptional figures such as 3,446 mg./g./hr. for almond leaves determined by Mrs. Poljakoff on a May day near Jerusalem, and the enormous figure of 4,890 mg. found by Vassiliev for ground-water plants of the sandy Karakum desert. Finally he deals with the effectiveness of equilibration of the water balance under the hard conditions prevailing in Palestine. Sometimes an effective balance is not achieved. This is indicated by very low figures of relative transpiration, high water deficits in the plant, periodically rising osmotic values, and dying off of aerial organs such as leaves, peripheral branches, and tree tops. Again copious examples embellish this story of fundamental interest.

Avocadoes.

(*See also* 2146, 2987.)

2924. Hodgson, R. W.
Report of long-term research on the avocado.
Calif. Agric., 1951, **5**: 12: 8-11, illus.
Studies on alternate bearing in Fuerte suggest that trees become so exhausted of reserve materials by a large crop that they are unable to mature another large crop the following year. The evidence points to these depleted reserves being organic, mainly starch, rather than mineral. Removal of the whole on-year crop at any stage up to horticultural maturity will change the stride of alternation. Early harvesting of fruits on limbs or trees that have been girdled will also materially affect the time and amount of bloom for the succeeding crop. Attempts are being made to breed Fuerte-like varieties with a more regular bearing habit. Rootstock studies involve seedling selections and selections of

12 named varieties and, more recently, trials with closely related species; the evidence to date suggests that differences in performance exist within both the Mexican and Guatemalan races, that incompatibility exists between some Guatemalan varieties and Mexican rootstocks, and that Mexican rootstocks are more susceptible to soil salinity than Guatemalan. Earlier and more uniform germination has resulted from removal of the seed coat or mutilation of the cotyledons. A method of rooting cuttings has recently been developed. Storage studies have shown decided benefits from reducing the oxygen content and increasing the CO_2 content of the store. Temperature has been found to have a marked effect on the production of ethylene gas during respiration and on the softening process which is closely associated with the climacteric in respiration.

2925. Stewart, W. S., and Hield, H. Z.
Effects of growth-regulating sprays on fruit set of avocado.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 53-6, bibl. 12, illus., being *Pap. Calif. Citrus Exp. Stat.* **698**.

On the basis of a prior survey with various chemicals, a yield experiment was conducted in which Fuerte (Newman strain) avocado trees were sprayed with 2,4-D or 2,4,5-T on one of four dates during the flowering season. A 5% kerosene emulsion containing either 25 p.p.m. 2,4-D as the isopropyl ester or 2 p.p.m. 2,4,5-T as the butyl ester was applied as a drenching spray. It was found the sprays had no significant effect on yield of normal fruit, but that the 2,4-D applied in April increased the yield of seedless fruit. The 2,4,5-T failed to induce any apparent responses in fruit growth. [Authors' summary.]

2926. Ayers, A. D., Aldrich, D. G., and Coony, J. J.
Leaf burn of avocado.
Calif. Agric., 1951, **5**: 12: 7, illus.

A tip burn of mature leaves caused by chloride accumulation to amounts exceeding 0·5% chloride on the dry weight basis and a patchy scorching associated with sodium accumulation are described. Chloride tip burn has been observed on Fuerte and many other varieties and sodium scorch on Fuerte, Itzamna and Anaheim, often in conjunction with tip burn. As the salt content of the soil under affected trees is not necessarily excessive the troubles would appear to be due to the accumulation in the trees of toxic quantities of Cl and Na ions over a period of years.

2927. Zentmyer, G. A., and Richards, S. J.
Pathogenicity of *Phytophthora cinnamomi* to avocado trees, and the effect of irrigation on disease development.
Phytopathology, 1952, **42**: 35-7, bibl. 5, illus.

The pathogenicity of *Phytophthora cinnamomi* to budded avocado trees in the field has been shown, and information has been obtained on the rate of progress of the root rot in the field. In infested soil the disease appeared sooner and caused more rapid damage on trees of a group given weekly irrigations than on those of a group irrigated once a fortnight. No harmful effect resulted from frequent irrigation alone. —Univ. of California Citrus Experiment Station.

2928. Zentmyer, G. A.
Evaluation of soil fungicides for control of *Phytophthora cinnamomi*.
From abstr. in *Phytopathology*, 1952, **42**: 24.

A rapid laboratory screening test was developed that gives good correlation with results in greenhouse and field. Three of 40 fungicides passed the screening test: Dithane D-14 and Parzate liquid (nabam), Vancide 51, and Dowicide G. Dithane D-14 was the most effective soil fungicide tested, killing *Phytophthora cinnamomi* at a dilution of 1 : 2,500 (1 : 13,150 active). D-14 drenches (1 : 500) reduced the population of *Phytophthora* with no injury to avocado seedlings in the greenhouse. Monthly and bimonthly irrigations of avocado trees in the field with Dithane D-14 during the past two seasons markedly reduced the population of *Phytophthora*.

2929. Pence, R. J.
Six-spotted mite on avocado.
Calif. Agric., 1951, **5**: 12: 5-6, illus.

The six-spotted mite, *Eotetranychus sexmaculatus*, has recently caused serious defoliation of avocadoes in San Diego county, Calif. In preliminary control experiments in 1951 several acaricides were applied as sprays in March or dusts in May. The most consistently good results were obtained with Aramite. There was no evidence that any of the acaricides arrested fruit development.

2930. Brown, E., and Jarvis, M. W.
Avocado oil from Kenya.
Colon. Plant Anim. Prod., 1950, **1**: 318-20.

This oil was produced from the Fuerte variety; the yield recovered was 20·8%, calculated on the whole fruit. After removal of petroleum spirit present, the quality of the oil was comparable with that of Californian oil. It is not now a normal article of commerce, and with liquid paraffin (at about 1s. per lb.) largely replacing vegetable oils as a cosmetic raw material, the market demand for avocado oil is uncertain, and the price, in competition with almond and olive oils, would probably be in the 3s.-5s. range or even lower. A.C.S.

Citrus.

(*See also* 2047, 2050, 2058, 2194, 2237f, 3021a, b, d-j, l, o, p, q, 3217.)

2931. Lucie-Smith, M. N.
The cultivation of West Indian limes.
J. agric. Soc. Trin. Tob., 1951, **51**: 354-66, illus.

A general account of methods of cultivating West Indian limes is concluded with recommendations to Tobago lime growers. Budding is advocated, preferably on Dominica wild grapefruit or rough lemon stock. The sour orange is semi-incompatible with the lime. The Gospo orange or Sweet Seville, which may be a sour orange mutant or a sour × sweet orange hybrid, appears to make a slightly better stock for limes and might be used for damp, heavy soils where gummosis is likely to be troublesome. Other recommendations include the establishment of windbreaks and tephrosia covers, the annual application in April-May of at least 4 lb. sulphate of ammonia per tree

and the correction of Zn deficiency by spraying and of Mg and K deficiencies by soil applications.

2932. Ahmad, M. N., and Ullah, M. H.
Two new varieties of sangtra orange—Kinnow mandarin and Feutrell's Early.
Punjab Fruit J., 1950, **14**: 48: 21-3.
These two imported varieties have given encouraging performances at Lyallpur where local varieties of *Citrus nobilis* are very subject to sun-burn. In each case the tree, its fruit, harvesting season and fruit composition are described.

2933. Hu, C. C., and Cameron, J. W.
Fruit characteristics in old line and nucellar Valencia oranges.
Calif. Citrogr., 1951, **37**: 48, 67-8, bibl. 3.
Comparisons were made between the fruits of 5 nucellar lines of Valencia orange and between 3 of these nucellar lines and their parents. There were no marked differences in fruit shape, percentage juice, soluble solids or acid, but the two youngest ("juvenile") lines, each about 12 years old, showed typically larger fruits, thicker rinds, larger core size and lower seed counts. The line Olinda, believed to be about 25 years old, possessed particularly promising fruit characters. The three nucellar lines, Campbell, Cutter and Frost, have all grown more vigorously than their parents. A more detailed account is being published shortly.

2934. Batchelor, L. D., and Calavan, E. C.
Lemon strain selection and longevity of the trees.
Calif. Citrogr., 1952, **37**: 94, 110-12, bibl. 7, illus.
Longevity of lemon trees.
Calif. Agric., 1952, **6**: 3: 9-10.
Details are tabulated and discussed of the average degree of decline and percentage of trees showing shell bark among 5 selections of Eureka lemon and 7 of Lisbon lemon all on sweet orange stock and planted in 1936, and among 10 Eureka, 13 Lisbon and 4 Villafranca selections on both sweet and sour orange stock planted in 1940. The trials show that most if not all the older Eureka selections and some Lisbon strains, especially the open type, are short lived. However, some of the so-called "short-thorned" Lisbon selections give promise of being long lived. All 4 Villafrancas showed some decline at 10 years. The same general trends were apparent in the trees on both sour and sweet orange stock. These results help to explain why Lisbon lemons habitually yield 30 to 40% more fruit than Eureka. The main hope for the latter lies in the development of nucellar strains, several of which are now on trial.

2935. Escalante, M. G.
Los pomelos (*Citrus paradisi* Macfad.) cultivados en la Argentina. **(Varieties of grapefruit (*Citrus paradisi* Macfad.) grown in Argentina.)** [German summary 5 lines.]
Lilloa, 1949, **17**: 113-38, bibl. 18, illus. [received 1952].
There has been much confusion over the identity of grapefruit varieties in Argentina. Keys are here given for the identification of the 8 *Citrus* species and 10 varieties of *C. paradisi* grown in the country, and the value of the diagnostic characters is discussed. Illustrated descriptions are then given of each of the grapefruit varieties, their economic importance being indicated.

2936. Singh, R. N.
Probable bud sports in citrus.
Curr. Sci., 1951, **20**: 105, bibl. 1.
Variant fruits observed on a citron and a Malta sweet orange tree at the Fruit Research Station, Saharanpur, U.P., are described.

2937. Fu, W. H.
Germination and storage of trifoliate orange seeds.
Calif. Citrogr., 1951, **37**: 38-9, bibl. 2.
Germination of trifoliate orange seeds is often slow and irregular. These investigations showed that: It is very important to avoid drying the seeds; seeds collected later in the season have a more rapid rate of germination; chilling the seed at 42° F. for at least 30 days before sowing, either in the fruit or stratified in moist sand, considerably hastens germination. Moist sand at 42° F. also proved suitable for storage up to at least 5 months without marked reduction in viability; alternatively, burial 15 ins. deep in the ground proved satisfactory for storage when soil temperatures were relatively low. A.C.S.

2938. Schroeder, C. A.
Shoot growth in citrus.
Calif. Citrogr., 1951, **37**: 16, 18, 20, bibl. 7, illus.
Descriptions are given of the 2 kinds of node in citrus, namely leaf node and growth node separating growth flushes, the variability of growth flushes, shoot-length growth, which results from a sequence of flush growths from false terminal buds, phyllotaxis, and thorns. In citrus phyllotaxis is $\frac{3}{8}$; the spiral leaf arrangement is constant in direction in a given growth node, though the original spiral direction—left or right—assumed by a seedling is determined by chance; there is, however, a reversal of direction of the spiral in each succeeding growth node along the stem, and similarly lateral shoots have a reversed spiral direction to that of the stem from which they arise. Particulars are also given of similar arrangements of thorns and lateral branches. A.C.S.

2939. Ahmad, S., and Musahib-ud-Din.
Relation of growth and fruiting in grapefruit.
Punjab Fruit J., 1951, **15**: 50: 15.
Records kept at Lyallpur on 6 Marsh Seedless grapefruit trees on Chakotra stock (*C. grandis*) showed that growth occurred in 4 flushes appearing, in descending order of vigour, in March, June, July and November. Growth extension was greater in terminal than in lateral shoots and the same applied to leaf area except in the June flush. Flowering was directly proportional to extension growth as a whole, but within a flush shoots of medium vigour were fruitful while weak and very vigorous shoots remained almost barren. There was a tendency for shoots with large leaf areas to produce more blossoms, but the correlation was not significant. The first shoots produced in a flush were more fruitful than those produced later in the same flush.

2940. California Citrus Experiment Station (Parker, E. R.).
Research in orchard management.
Calif. Agric., 1951, **5**: 11: 8-9, illus., and *Calif. Citrogr.*, 1952, **37**: 96, 114-15, illus.

This concise outline by the Division of Orchard Management mentions the following research in progress: *Citrus:* Selections are being tested of strains and nucellar seedlings of lemons and Valencia oranges. Rootstock effects are being investigated including the susceptibility of nearly 200 kinds to quick decline when budded with sweet orange. The problem of replanting citrus in old citrus soils is being studied, and there is already evidence that some of the newer rootstocks may promote better growth than sweet orange and some others. A large variety collection has been established. Other investigations include the problem of lemon tree collapse, long-term fertilizer experiments, the spray application of both major and minor elements, and studies on the effects of variety strains, rootstocks and fertilizers on fruit size and quality. *Figs:* A monograph is being prepared on a collection of 120 varieties. Breeding is being continued. *Avocadoes:* In addition to variety trials two fertilizer trials have recently been started.

2941. Aldrich, D. G., and Martin, J. P.
Effect of fumigation on some chemical properties of soils.
Soil Sci., 1952, **73**: 149-59, bibl. 21, being *Pap. Calif. Citrus Exp. Stat.* **703.**

It is concluded from the evidence presented that the stimulation of citrus trees planted in fumigated, old citrus soils cannot be attributed to increased nutrient availability, although that possibility definitely exists where other crops and certain soil types are involved.

2942. Kimball, M. H., and others.
Nontillage without covercropping in a California citrus orchard.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 141-5, bibl. 17.

The non-tillage, non-covercropping system of soil management, involving the control of weeds with oil sprays, was started in 1919 and by 1950 about 20% (60,000 acres) of the citrus in southern California was managed in this way. The system was applied to a 12-year-old Valencia orchard at the University of California, Los Angeles, and has been continued for 9 years. Compared with tillage, non-tillage gave a 17% yield increase for the past 7 years and a considerable increase in fruit size, and resulted in about twice as many rootlets being formed in the surface foot of soil. In both systems there were few roots closer than 3 in. to the surface, except where the soil was shaded. Soil organic matter increases under non-tillage were confined to the immediate surface and there were no differences for the 0-6 in. layer as a whole. The literature on the subject is reviewed briefly. [For another account see *H.A.*, 20: 3126.]

2943. Parker, E. R., and Jones, W. W.
Orange yield and fruit size.
Calif. Agric., 1951, **5**: 11: 4, 14.

In a 22-year-old experiment with Washington Navel on sweet orange stock growing in a loam soil in southern California it has been shown that winter cover crops increased yields and fruit sizes by comparison with clean cultivation. F.Y.M. applied alone in spring or autumn tended to reduce yields by causing temporary reductions in nitrate-nitrogen at the time of fruit setting in the spring, but when in the last 10 years 3 lb. N was applied per tree, half in F.Y.M. and half in inorganic form, yields, fruit size and soil structure improved. The addition of P, K or S to the F.Y.M.+N programme had no beneficial effects.

2944. Aleksandrov, A. D.
Growing lemons in rooms. [Russian.]
Sad i Ogorod, 1952, No. 2, pp. 44-7.

This is a general account with advice on cultural operations for growing lemons in pots and tubs in rooms. Trifoliata, not being evergreen, is unsuitable as a rootstock under these conditions as it induces premature leaf-fall.

2945. Southwick, R. W.
Citrus irrigation in interior areas.
Calif. Citrogr., 1951, **37**: 49.

The field capacities, wilting points, available water and water storage capacities are tabulated for the 6 to 48 in. horizons of 6 soils in San Bernardino County, Calif., with notes on tree growth and root distribution. It is pointed out that the storage capacity of the soils ranges from 6·12 acre inches between 6 and 48 in. in a deep loam to 1·51 acre inches in a rocky sandy soil. In the former trees will go for 30 days without showing moisture stress, whereas in the latter some twig die-back and leaf drop occurred with a 10-14 day irrigation schedule.

2946. Gustafson, C. D.
Frost protection for young trees.
Calif. Citrogr., 1952, **37**: 135, illus.

Field trials in Southern California during the past 2 years have shown that the use of an "umbrella" type covering (a roof of sacking on a rough frame, with open sides) is a promising method for frost protection of young citrus and avocado trees; the sacking cover, which is 4 to 6 inches above the top of the tree, serves as a ceiling to intercept heat radiation at night.

A.C.S.

2947. Cooper, C. M.
Pollarding of Dancy mandarins.
J. Dep. Agric. S. Aust., 1952, **55**: 301-2, illus.

Drastic pollarding and skirting of Dancy mandarin trees carried out by a grower in the Berri irrigation area to improve size of fruit and to overcome alternate bearing, has given very promising results over the 3 seasons since the trees were treated. The pollarding was done in early September after all the fruit had been harvested. The trees were skirted up to 5 ft. from the ground, all limbs being removed to this level to facilitate cultivation and irrigation. Then all top growth down to about 9 ft. from the ground was removed leaving a band of foliage about 5 ft. wide running round the tree. This was thinned out and all large saw cuts treated with grafting mastic. Limbs and trunks exposed as a result of removal of top growth were sprayed with whitewash to prevent sun scald. The returns for the years 1948 (before pollarding), 1949, 1950 and 1951 (after pollarding) were £58, 69, 169, and £215 respectively.

2948. Wallace, A., Cameron, S. H., and Mueller, R. T.
Seasonal use and loss of nutrients and dry matter in orange trees.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 5-10, bibl. 10, illus.

All the blossoms, leaves and fruits that fell from 2 14-year-old Valencia orange trees growing on sweet orange roots of the same parentage were collected on mesh wire platforms during the two-year period 1942-44 and chemical and weight determinations made weekly. To obtain a measure of the nutrients used annually these data were combined with those of harvested fruit and new leaves and twigs. In the first 12-month period which covered the end of an on-crop season and the beginning of an off-crop season the materials used in grammes per tree were: dry matter, 40,395; N, 673·2; P, 69·1; K, 574·3; Ca, 617·7; and Mg, 67·1. During the second 12-month period covering the end of the off-crop season and the beginning of a second on-crop season the amounts were: dry matter, 40,951; N, 611·6; P, 68·3; K, 540·6; Ca, 566·2; and Mg, 68·5. Estimates are given of the amounts of N, P and K returned to the tree by translocation before leaf abscission and of the organic matter and nutrients returned to the soil in shed parts.—Univ. Calif.

2949. Cameron, S. H., Mueller, R. T., and Wallace, A.
Measurement and chemical composition of the seasonal new growth of mature Valencia orange trees.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 11-13, bibl. 6.

Dry matter and nutrient contents of new leaf and twig growth were measured for 6 successive growth flushes of 17-year-old Valencia orange trees during 1945 and 1946. The trees were of the same batch as those described in the preceding abstract (Wallace, Cameron and Mueller). Four out of 24 trees were sprayed with a dilute cold water paint at the initiation of each of the 6 successive growth flushes so that the new growth could be identified and "harvested" when the leaves appeared to be mature (when about 15 weeks old). Each tree was only used for one flush removal. In 1945, an off-crop year, 47,373 new leaves weighing 10,775 g. were produced per tree; and in 1946, an on-crop year, 47,872 leaves weighing 7,942 g. Dry weights, numbers of units (leaves and twigs) and N, P, K, Ca and Mg are tabulated for each of the growth flushes. In both years the spring flush was by far the largest and the leaves on this flush smaller than those produced later. There were marked variations in chemical composition between flushes in the same year as well as between corresponding flushes of the two years.—Univ. Calif.

2950. Jones, W. W., and Steinacker, M. L.
Seasonal changes in concentrations of sugar and starch in leaves and twigs of citrus trees.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 1-4, bibl. 5, being *Pap. Calif. Citrus Exp. Stat.* **695.**

Data presented show seasonal changes in the concentrations of sugar and starch in leaves and twigs of the Valencia orange and in leaves of the Eureka lemon for the 1948-1949 season. Both starch and sugar are at a minimum during the summer months. Sugar is at a maximum during the winter months, while starch remains low. This increase in sugar during the winter months, without an accompanying increase in starch, probably constitutes a "cold reaction" in citrus. There is an increase in starch in early spring just previous to the spring flush of growth. Apparently any flush of growth is preceded by an accumulation of starch in the leaves. Changes in carbohydrates in orange twigs are similar to those in the leaves but less marked. [Authors' summary.]

2951. Winnik, M.
Some effects of P and K deficiencies on orange tree growth, composition and fruit quality.
Trans. 4th int. Congr. Soil Sci., Amsterdam 1950, Vol. I, pp. 240-2, bibl. 2 [received 1952].

In experiments in Israel the only results of adding N to Jaffa trees on sour orange stock planted in lysimeters were in one case to cause sterility, delay in general development and appearance of certain leaf symptoms, and in another, where the tree had received additional green manure, a decrease in fruiting and inferior fruit quality. A change in the composition of the various organs of the tree was also induced, depending on the degree of the deficiency of P and K. The addition of the deficient elements, particularly of P, restored productivity; P rendered the skin thinner and reduced acidity, while K tended to increase acidity, size of fruit and to some extent, thickness of skin.

2952. Vanselow, A. P.
Microelement research with citrus.
Calif. Citrogr., 1951, **37**: 77-80, illus.
Microelements in citrus.
Calif. Agric., 1952, **6**: 1: 5, 14, illus.

Sweet orange seedlings were planted in soil in pots, to which nickel had been added to give concentrations of 0, 25, 75, 150 and 300 p.p.m. Those in the two highest concentrations died immediately or soon after planting. Plants in the 75 p.p.m. concentration were severely stunted, showed some mottling resembling Zn deficiency, and had a much reduced top/root ratio. Plants in the 25 p.p.m. were slightly smaller than the controls. Ni and other minor elements in young and mature leaves were determined spectrographically. The presence of toxic amounts of Ni appeared to lower the uptake of Cu and increase that of Cr, Mn and Pb. Among orchard leaf samples examined so far few had Ni contents high enough to be considered harmful, but in one case it would appear that excessive soil acidity may have made toxic quantities of Ni available to the trees.

2953. Cooper, W. C., Gorton, B. S., and Olson, E. O.
Ionic accumulation in citrus as influenced by rootstock and scion and concentration of salts and boron in the substrate.
Plant Physiol., 1952, **27**: 191-203, bibl. 26.

One-year-old trees of Valencia orange and Shary Red grapefruit, each on sour orange and Cleopatra mandarin rootstocks, were grown for 39 weeks under differential common salt and boron treatments. The

effect of the treatments on the accumulation of ions in the leaves is summarized as follows. *Boron.* Increases in the amount of boron added were associated with increases in the boron content of leaves of all plants but accumulation was greater for trees on Cleopatra mandarin rootstock than for those on sour orange. Adding only salt did not influence the boron content of leaves; but, at the 6 p.p.m. level of boron supply, salinization resulted in a lower level of boron in the leaves. *Chloride.* The leaves of trees on sour orange rootstock in the plots receiving salt accumulated approximately twice as much chloride as the trees on Cleopatra rootstock. The uptake of the chloride ion in the trees in the boron plots was similar to that of the control. *Sodium.* More sodium accumulated in the roots than in the leaves of trees in the salt plots. There was a significantly greater accumulation of sodium in the leaves of the grapefruit scion on both rootstocks than in those of the Valencia scion. *Calcium.* The salt treatment increased the calcium content of most scion-rootstock combinations while the boron treatment tended to decrease calcium accumulation. Both scion and rootstock influenced the accumulation of calcium in leaves, but an interaction between treatment and scion-rootstock combination was not established. *Potassium.* The concentrations of potassium were inversely related to those of calcium. In the controls potassium was higher in scions on sour rootstock than in those on Cleopatra. The salt treatment induced an increase in potassium accumulation of the Shary scion on sour rootstock and a decrease in this scion on Cleopatra rootstock. The boron treatment tended to increase the potassium accumulation in leaves of all combinations. *Magnesium.* The treatments had no effect on magnesium accumulation in the leaves, but the accumulation was greater in the leaves of trees on Cleopatra rootstock than on sour orange.—Texas agric. Exp. Stat., Substat. 15, Weslaco.

2954. BLONDEL, L., AND CASSIN, J.
Lutte contre la carence en manganèse chez les agrumes. **(The control of manganese deficiency in citrus.)**
Fruits et Prim., 1951, **21**: 6-8, bibl. 9.

Chlorotic Clementine mandarin trees at the Experimental Station at Boufarik, Algeria, were sprayed with a number of minor elements. Those sprayed with $MnSO_4$ at 500 g. plus lime at 250 g. per hl. became a normal green colour in 3 weeks. Leaf and soil analyses confirmed that the trouble was due to Mn deficiency. The ash of markedly deficient leaves contained 0·04% Mn, of slightly deficient 0·08%, of normal green 0·10% and of treated leaves that had become green 0·50%. The soil at 50 cm. under a very deficient tree contained 0·014% Mn and under a normal tree 0·025%. The cost of materials and labour worked out at 15 or 16 fr. per tree.

2955. AHMAD, S., AND KHAN, M.-u.-D.
The time of fruit bud formation in grapefruit.
Punjab Fruit J., 1951, **15**: 51: 18-23, bibl. 11, illus.

The examination during 1947-48 of 540 buds from 3 Marsh grapefruit trees at Lyallpur showed that blossom bud differentiation coincided with the initiation of new growth in the spring. The active period of differentiation occurred over a fortnight from 15 February to 1 March. The proportion of fruit buds was slightly higher in the earliest than in later flushes and in terminal buds than in laterals.

2956. BALLOT, —., AND OTHERS.
Études sur la mise à fruit du Clémentinier. **(Studies on attempts to induce bearing in the Clementine orange.)**
Publ. Serv. Hort. Dir. Agric. Maroc **7**, 1952, pp. 36, illus.

From experiments carried out on the Clementine orange in different regions of Morocco to induce fruiting it is recommended that two successive circular incisions should be made in the framework branches through the bark down to the sapwood without removing the bark. These can be made with a cutting wheel 30 mm. in diameter and cut out of sheet steel 0·8 to 1 mm. thick. The first incision should be made when the flowers on the south side of the trees are expanding, the second 20 days later. All other methods tried experimentally were distinctly inferior to the double incision.

2957. SINHA, A. C., AND MALLIK, P. C.
A study of premature drops in oranges in Bihar.
Indian J. agric. Sci., 1950, **20**: 347-57, bibl. 11 [received Nov. 1951].

In Bihar citrus trees bloom twice a year, first in Feb.-March called *ambe-bahar* and secondly in June-July called *mrig-bahar*. The first crop matures in Dec.-Jan. and the second in April. Records kept in several localities show that fruit drop, which is often considerable, is much greater with the early crop than with the later. It starts in mid-August, reaches a maximum in the second half of September and declines to nil by the end of October. It was found that the extent of the drop is positively related to the amount of rain and the number of rainy days in the preceding month; it ceases when the weather becomes dry and colder. The Malta [sweet] orange was more severely affected than the loose-skinned Nagpur orange. With the latter dropping was heavier in " off " years than in " on " years.

2958. SHAH, S. M. I.
Causes leading to premature shedding of fruits in citrus (variety Seville orange).
Punjab Fruit J., 1951, **15**: 51: 38-41, bibl. 6.

In a comparison between fallen fruits and fruits picked on the same day from 20-year-old sour orange trees it was found that in 8 out of 10 samples the former contained fewer seeds. The difference between the average number of seeds for the 10 samples just missed significance. The seeds from the fallen fruits had significantly smaller N contents in each of 5 samples than the seeds from fruits retained on the trees.

2959. ERICKSON, L. C.
Effects of 2,4-D on drop of sound and unsound Washington Navel oranges.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 46-52, bibl. 6, being *Pap. Calif. Citrus Exp. Stat.* **694.**

During November to February Washington Navel orange trees in 3 orchards were sprayed 4 times at monthly intervals with 8 p.p.m. 2,4-D in the form of the isopropyl ester. The majority of fruits dropping from

unsprayed trees were divided into 4 classes which were, in decreasing order, split, frozen, sound and blackrot. Spraying with 2,4-D reduced fruit drop of all 4 classes, but only with sound fruit was the reduction (averaging 70·7%) consistently highly significant. The drop of frozen fruit was reduced by 35·5% and that of other classes by 15·0 to 19·8%.

2960. Erickson, L. C.
Plant growth regulators for lemons.
Calif. Citrogr., 1952, **37**: 179, 201-2.

Recent experiments on the use of 2,4-D and 2,4,5-T on lemons are reviewed. Both reduce mature fruit drop, when spraying is done in the winter period with 8 p.p.m. and 4 p.p.m. respectively; spraying should not be done when new growth is forming or during or immediately before spring bloom because new growth is liable to show modifications and injury; 2,4-D may alternatively be applied in a late summer or autumn oil spray. 2,4,5-T (but not 2,4-D) sprayed after fruit set generally increases fruit size but is not at present recommended because of variable effects on yield. Both 2,4-D (500 p.p.m.) and 2,4,5-T (200 p.p.m.), when used in the packing house, have tended to increase the storage life of lemons; the number of black buttons after storage was reduced to about one-quarter, decay was also much reduced, and ageing of the fruit delayed.
A.C.S.

2961. Schneider, H.
Bud union problems of lemon trees on sour orange rootstock.
Calif. Citrogr., 1952, **37**: 208-12, bibl. 7, illus.

After 1926, owing to frequent decline from 10/15 years of age onwards, the use of sour orange rootstock for lemons was discontinued by many growers; observations indicate, however, that certain combinations of lemon and sour orange varieties can be grown successfully. This paper describes a necrosis of sieve tubes which occurs just below the bud union of some lemon strains on sour orange, but not on other stocks. It should be noted that Calavan *et al.* described a sieve tube necrosis of the lemon scion causing a decline varying in severity with different scions and occurring on all species of stocks [see abstract 2964]. There are indications that the two types of necrosis arise from different causes. To avoid stock necrosis, strains of lemon of known satisfactory performance on sour orange root should be used.
A.C.S.

2962. Schneider, H.
Necrosis of sieve tubes below the bud unions of lemon trees on sour-orange rootstocks.
From abstr. in *Phytopathology*, 1952, **42**: 18.

Most lemon strains on sour-orange rootstock in California are especially subject to decline, and the use of that rootstock has been largely discontinued. Necrosis of sieve tubes and hyperplasia of rays immediately below the bud union of declining trees on sour-orange rootstock have been observed. Strains free from decline are free from necrosis below the union. There are indications that the strain of lemon and not the strain of rootstock is responsible for the decline.

2963. Schneider, H.
The importance of bud unions in the development of lemon sieve-tube necrosis.
From abstr. in *Phytopathology*, 1952, 42: 18.

Rootstocks inducing necrosis of sieve tubes above the bud union of lemon trees but free of it themselves are sweet orange, sour orange, grapefruit, various mandarins, Palestine lime, and Sampson tangelo. Rough lemon stocks at times show some necrosis of older sieve tubes below the bud union. Lemon trees propagated on various lemon strains in some instances showed necrosis above and below the union.

2964. Calavan, E. C., and others.
Collapse and decline of lemon trees.
Calif. Citrogr., 1951, **37**: 46-7, 63-6, bibl. 21, illus.

An increasing number of 5- to 20-year-old lemon trees in southern California have been affected by decline and collapse in the past 25 years. Sieve-tube necrosis is a primary symptom. Secondary symptoms include the disappearance of starch from the roots, sometimes up to the bud union, and rotting of the roots. Growth and foliage symptoms are described in detail. Studies started in 1948 have shown the disorder to possess a cyclic nature, some trees showing apparent recovery while others are declining or collapsing. Fungi and bacteria do not appear to be of primary importance and the failure of transmission tests do not confirm the presence of a virus. The tendency to collapse, which is most pronounced among Eureka and some Lisbon lemons, appears to be associated with certain strains of these varieties. Collapse is commoner in trees on grapefruit or sweet orange stock than in those on rough lemon or sour orange, but again there appears to be variation between strains of each of these rootstocks. Pruning declining trees remains the only remedy, though its value is limited. In new plantings greater use should be made of propagating material from vigorous, long-lived trees. Nucellar seedlings of Eureka seem generally to be superior to the old lines, though several of them show sieve-tube necrosis and one, the Frost Eureka, has also shown shell bark.

2965. McClean, A. P. D.
Virus infections of citrus in South Africa.
Citrus Gr, 1951, No. 207, pp. 1-5, bibl. 5, illus., and No. 208, pp. 11-16, bibl. 9, illus.

Investigations on the virus diseases of citrus in South Africa are reviewed in the light of experience gained in other countries. The diseases are (1) scaly bark or psorosis, (2) a tristeza type disease, (3) stem-pitting of grapefruit and limes. It is concluded that virus infection is now so general in citrus in South Africa that it has virtually become part of the tree itself. The effects of this and the dangers involved, particularly for grapefruit, are discussed. Rootstocks offer a particular problem, because under South African conditions not only the sour orange, but also the sweet lime, trifoliate orange and sweet rough lemon have proved unsatisfactory, due largely, it is believed, to virus infection.

2966. Fernandez Valiela, M. V.
Tristeza o podredumbre de las raicillas de los citrus en la República Argentina. (**Tristeza or root rot of citrus in Argentina.**) [English summary 1½ pp.]
Publ. téc. Centr. nac. Invest. agríc. Reg. Pampeana **1**, 1951, pp. 63, bibl. 36, illus.

Tristeza disease is well established in the coastal area

and northern districts of Argentina. Earlier results indicating that the disease is of virus origin have been confirmed. Trees were shown to be susceptible at any age or period of growth. In trials with 9 rootstocks, 4 (sour orange, lemon var. Villafranca, grapefruit and Chinese citron) were found to be susceptible, while the rest (sweet orange, Rangpur lime, Cleopatra mandarin, rough lemon and trifoliate orange) were symptomless carriers. The disease was controlled by certain cultural practices such as inarching with resistant varieties, or removing the infected scion and regrafting with lemon, but these practices are considered uneconomic. It is recommended that all new plantations should include at least 3 resistant stocks, such as those classed as symptomless carriers above. In a discussion on the physiology of infected plants it is pointed out that degeneration of the sieve tubes is only a secondary cause of the trouble, while the primary cause appears to be the transfer downwards through the union of some substance lethal to the stock. The action of the lethal substance is not known, but it is thought to inhibit the activity of the meristem. [See also *H.A.*, 21: 1974.]

2967. COURANJOU, A.
Échec à la psorose. **(The control of psorosis.)**
Fruits et Prim., 1951, **21**: 2-5, bibl. in text, illus.

It is claimed that about 90% recovery occurred in 411 18-year-old Thompson Navel trees all suffering badly from psorosis following soil applications at a rate of 500 g. per tree of a compound of polynitrocycloaralkyloxybenzene with 0·5% carbon. In earlier attempts to cure trees of the virus liquid potassium permanganate applied to the soil in 3 doses spread over a year totalling 3 kg. effected a cure lasting 4 years, but was too expensive, while various other treatments, including applications of minor elements, were ineffective.

2968. RIEUF, P.
À propos de traitements de la psorose des agrumes. **(On treatments against psorosis of citrus.)**
Fruits et Prim., 1951, **21**: 121-3, bibl. 2, illus.

Healthy trees should be protected by being set a sufficient distance from diseased or old trees to prevent transmission via the roots and by the disinfection of pruning tools when moving from one tree to the next. Once the disease appears the lesions should be scraped and disinfected. As regards control by chemical means growers are urged to exercise caution before adopting various methods suggested recently. [See abstract 2967 above.]

2969. CHAPOT, H.
Les viroses des agrumes en Afrique du Nord. **(The virus diseases of citrus in North Africa.)**
Fruits d'Outre Mer, 1951, **6**: 477-9, bibl. in text, illus.

Several recent articles [including that referred to in abstract 2967], have given misleading information about virus diseases in French North Africa. This note confirms that quick decline and related diseases have not been identified in the Mediterranean basin and that for psorosis, which is widespread, there is no known internal method of cure nor any external form of remedy which has more than a purely temporary effect.

2970. DUCHARME, E. P., AND SUIT, R. F.
Xyloporosis of citrus in Florida.
Plant Dis. Reptr, 1951, **35**: 556-7.

Xyloporosis, a disease of citrus trees budded on sweet lime rootstock, previously recorded in Palestine, Brazil and Argentina, was recognized in Florida during the past summer in trees on a so-called sweet lemon rootstock. The symptoms were first observed on Hamlin, Jaffa, Lue Gim Gong, and Valencia varieties of sweet orange, and Ruby Red grapefruit. Unaffected trees were twice the size of the diseased trees and had three to four times the bearing surface. At present xyloporosis is not of major importance in the Florida industry because this particular rootstock is not commonly used.—Florida Citrus Exp. Stat., Lake Alfred, Florida.

2971. ŠNEĬDER, JU. I.
The application of copper oxychloride for the control of bacterial necrosis of citrus. [Russian.]
Sad i Ogorod, 1952, No. 3, p. 28.

In continuation of his trials [*H.A.*, 21: 1984] for the control of citrus bacteriosis [? *Pseudomonas syringae*] the author found that copper oxychloride compared favourably with bordeaux mixture.

2972. CALAVAN, E. C., AND OTHERS.
Control of blossom blight of lemons.
Calif. Citrogr., 1952, **37**: 180, 190, bibl. 6, illus.

Earlier trials with copper sprays gave limited protection but not good control of this blight caused by *Botrytis cinerea*. A full coverage spray of ferric Dithane (ferric ethylene bisdithiocarbamate) gave good protection for about 2 weeks, the control obtained with 11 other fungicides being less satisfactory. To avoid injury to fruit and young leaves when using ferric Dithane, the stated mixture should not be varied and the spray should not be applied within 3 weeks of an oil spray application. Despite the short period of effective control, protection of a highly desirable bloom during a critical period appears practicable. A.C.S.

2973. GOIDÀNICH, G., AND RUGGIERI, G.
Il carattere della resistenza dei *Citrus* al parassitismo della *Deuterophoma tracheiphila* Petri. **(The character of the resistance of some *Citrus* species against the parasitism of *Deuterophoma tracheiphila* Petri.)** [English summary 10½ lines.]
Boll. Staz. Pat. veg. Roma, 1947 (issued 1950), **5**: 69-80, bibl. 17, illus.

Laboratory tests with the juices from the cortex and wood of sweet and sour orange (which are respectively resistant and susceptible to "mal secco" disease) have shown that the juices contain substances which markedly stimulate the germinative energy and further development of the mycelium of *Deuterophoma tracheiphila*, but no appreciable differences have been detected between the two species. The character of resistance to the parasite is discussed in the light of these and other observations.

2974. Goidànich, G., and Ruggieri, G.
Effetti del freddo e " mal secco " negli agrumeti siciliani. **(The action of low temperatures and the " mal secco " disease in Sicilian citrus groves.)** [English summary 4½ lines.]
Boll. Staz. Pat. veg. Roma, 1949 (issued 1951), **7**: 43-9, bibl. 2, illus.
Observations on " mal secco " disease in Sicilian citrus groves have shown that low temperatures can be a predisposing factor for infection by the fungus *Deuterophoma tracheiphila*, but they are not necessary for the parasite to become established.

2975. Lauriol, F.
Quelques aspects de la lutte contre les *Penicillium* des agrumes. **(Some aspects of the control of penicillium moulds of citrus.)**
Fruits d'Outre Mer, 1951, **6**: 412-20, bibl. 19, illus.
From a review of the literature on blue and green moulds of citrus fruits the author concludes that so many factors influence the development of these diseases that effective control can only be achieved by a combination of actions. These are the taking of all possible steps to prevent bruising from the time the fruit is picked until it reaches the consumer, the control of such physical factors as temperature and humidity during transport and storage, and the use of chemical treatments to supplement the other measures.

2976. Chowdhury, S.
Gummosis of citrus in Assam.
Sci. and Cult., 1951, **16**: 570-1, bibl. 14.
The relative susceptibility to gummosis of several citrus species grown in Assam is indicated. The organism primarily responsible is *Phytophthora parasitica*. Inoculation trials suggest that *Fusarium lateritium*, when associated with phytophthora, may intensify the severity of the disease though it will not by itself cause gummosis.

2977. Rossetti, V., and Bitancourt, A. A.
Thiamin and the growth substances for *Phytophthora* in the bark of citrus trees.
Science, 1952, **115**: 205-6, bibl. 4.
Experiments are described in which discs of citrus bark from several varieties were placed in agar media for 4 hr. and then removed before the media were inoculated with *Phytophthora citrophthora*. The growth of the fungus on these media was compared with that on untreated agar and agar treated with thiamin. The results support the theory that differences in the susceptibility of citrus species to *Phytophthora* are due, at least in part, to the amount of growth substances in the bark of the host. A factor, designated *L*, would account for differences found between 2 varieties of sweet orange, whereas thiamin, or substances producing a similar effect, would account for the difference between the sweet orange and sour orange. It is also suggested that the characteristic concentric zoning in the inner bark of citrus corresponding to a 24-hr. growth periodicity may be due to changes in the amount of growth substances in the bark during the period of 24 hr.

2978. Chowdhury, S.
' Felt ' disease of citrus in Assam.
Sci. and Cult., 1951, **17**: 264-5, bibl. 9, illus.
The branches and twigs of certain, but not all, species of citrus in Assam are affected by felt disease caused by *Septobasidium pseudopedicellatum*. The development of felt appears to bear a relation to the incidence of scale insects. The damage caused by it is slight.

2979. Baines, R. C., and Clarke, O. F.
Citrus-root nematode.
Calif. Citrogr., 1951, **37**: 60, 62, 86, bibl. 2, illus., and *Calif. Agric.*, 1952, **6**: 2: 9, 13, illus.
The effect of citrus-root nematodes, *Tylenchulus semipenetrans*, on the growth of young citrus trees was studied in 10 trials involving sour and sweet orange seedlings, unworked or budded with Valencia orange, and sour orange budded with Eureka lemons. Half the trees were inoculated with nematodes and their growth compared with clean trees after 9 to 19 months. The average fresh weight of the tops ranged from 10 to 50% less than that of the clean trees. In one case where the infestation was severe the roots of infested trees weighed only 54% as much as the roots of clean trees. In some of the trials the leaves showed a fine mottle which suggested that the nematodes, in addition to injuring the bark of the roots, removing plant nutrients and impairing normal growth and functioning, had introduced a toxic substance. In field tests, to be published in detail later, the nematode was eradicated by fumigation with DD at 500-1,000 lb. per acre injected at 12-18 in. spacings and depths of 12-15 in. As the fumigant is toxic to citrus no planting should be done until 4 months have elapsed.

2980. Baines, R. C., and Thorne, G.
The olive tree as a host of the citrus-root nematode.
Phytopathology, 1952, **42**: 77-8, illus., being *Pap. Calif. Citrus Exp. Stat.* **701.**
From reciprocal inoculations it was found that the nematode occurring on olive roots in California is apparently similar to the citrus-root nematode, *Tylenchulus semipenetrans*, obtained from orange roots. The citrus-root nematode readily completed its life cycle on olive roots, but the olive did not appear to be so favourable a host as the orange. The olive tree should be recognized as a host in any programme planned for the control of the citrus-root nematode. [A short note to the same effect by the same authors will be found in Calif. Citrogr., 1951, **37**: 74.]

2981. Lewis, H. C., and others.
Brevipalpus mite on citrus in California and Arizona.
Calif. Citrogr., 1952, **37**: 146-8, illus.
Infestations of the brevipalpus mite (*Brevipalpus lewisi*, McG.) have recently become noticeable on citrus in the hot dry interior valleys. This increased activity is possibly partially due to recent use of non-sulphur treatments (e.g. DDT) for thrips and citricola scale control; the use of some form of sulphur treatment in spring or winter is therefore recommended where mites are a problem. A.C.S.

2982. Fleschner, C. A.
New citrus red mite enemies from the Orient.
Calif. Citrogr., 1952, **37**: 156.
This note reports that the citrus red mite, *Paratetranychus citri* (McGregor), which was until recently considered a native of N. America, has in the past 3 years been found in S. China, Japan and Formosa, and is now presumed, therefore, to be native to the Orient. Seven species of its natural enemies were recently brought to California; 4 are being bred and, of these, *Stethorus gilvifrons*, a very small black ladybird beetle, appears to be the most promising. A.C.S.

2983. Jeppson, L. R.
New acaricides for control of citrus red mite, 1948-1950.
J. econ. Ent., 1951, **44**: 823-32, bibl. 5, being *Pap. Calif. Citrus Exp. Stat.* **689**.
In studies at Riverside, California, *p*-chlorophenyl-*p*-chlorobenzene-sulphonate (K-6451) was found to control the eggs and newly hatched citrus red mites, *Paratetranychus citri*, but was relatively ineffective against the adult stages. The addition of small quantities of various other compounds resulted in adequate initial kill of the adult mites without, however, improving ultimate control. Under field conditions K-6451 applied at the rate of 16 lb. per acre was more effective than the equivalent amount of bis-(*p*-chlorophenoxy)-methane (K-1875). Citrus injury was induced only by excessive dosages. Compound 88R (2-(*p-tert.*-butylphenoxy)isopropyl 2-chloroethyl sulphite) was also found to be more satisfactory for the control of citrus red mite than K-1875, though in coastal districts it caused slight pitting of young lemon leaves.

2984. Guillemain, R., and Alibert, H.
Les fourmis nuisibles aux vergers d'Afrique du Nord. Nouvelle méthode pour limiter leurs dégâts. (**A new method of limiting the damage done by ants in North African orchards.**)
Fruits et Prim., 1951, **21**: 12-14, bibl. 2, illus.
Two species of ant, *Tapinoma nigerrimum* and *T. simrothi*, are common in citrus and other orchards in North Africa. The latter in particular does considerable damage both by direct attacks on the trees and indirectly by encouraging other insects. Trials in the past 2 years have shown that the damage can be greatly reduced at low cost by fitting to the trunks glass wool bands impregnated with a mixture of 50% DDT at 200 g. and white oil at 100 g. in 10 l. water. This quantity is sufficient to treat 50 to 80 bands depending on their size, and each impregnation remains effective for 8 to 25 days depending on the temperature. To maintain adequate control it is merely necessary to re-treat from time to time those bands which ants are seen to be passing. Phosphoric esters, BHC and chlordane are less persistent, while mineral oils used alone are liable to damage the trees.

2985. Hepburn, G. A., and Bishop, H. J.
Control of false codling moth by means of insecticidal sprays.
Fmg S. Afr., 1951, **26**: 375-8.
A continuation of experiments for control of false codling moth (*Argyroploce leucotreta* Meyr) on citrus using DDT and parathion sprays is reported. An apparent reduction in infestation was not proved statistically. For the spraying of citrus trees, the writers prefer parathion to DDT, since its toxic action against beneficial insects is not so prolonged. With an average infestation of less than 5% in recent years, however, spraying would not appear to be justified.
A.C.S.

2986. Hanna, A. D.
Studies on the Mediterranean fruit fly, *Ceratitis capitata* Wied. (Diptera-Trypaneidae). III. Factors limiting the attack of the Mediterranean fruit-fly in citrus fruits.
Bull. Soc. Fouad Ier Ent., 1948, **32**: 175-202, bibl. 15, illus., from abstr. in *Rev. appl. Ent.*, 1952, **40**: 22-3.
An account is given of the part played by fruits themselves in limiting attack by *Ceratitis capitata* on citrus in Egypt. No correlation was found between acidity and infestation or between infestation and the thickness of the rind or its mechanical resistance to the ovipositor. Citrus fruits in Upper Egypt are not attacked, although peach in that region is heavily infested. The absence of infestation is attributed to climatic conditions, which favour the rapid drying of the rind round the oviposition puncture, so that the larvae cannot penetrate its walls. High Nile floods were observed to favour infestation. Unfavourable conditions of humidity can be produced by spacing the trees far apart, providing good drainage, and watering the trees sparingly.

2987. Lindgren, D. L., and Sinclair, W. B.
Fumigating citrus and avocados against oriental fruit fly.
Calif. Citrogr., 1952, **37**: 97, 118-19.
Tolerance of citrus and avocado fruits to fumigants effective against the oriental fruit fly.
J. econ. Ent., 1951, **44**: 980-90, bibl. 3, being *Pap. Calif. Citrus Exp. Stat.* **693**.
As part of a programme of precautionary measures to be adopted should the oriental fruit fly, *Dacus dorsalis*, be found in California, the tolerance of citrus and avocado fruits to several fumigation treatments was studied. Fumigation injury to fruits, which is described, appeared 5 to 14 days after treatment. Among orange, lemon and grapefruit varieties navel oranges were generally the most susceptible to injury. No injury to citrus followed fumigation with ethylene dibromide, ethylene chlorobromide or methyl bromide at a dosage of 1 lb. per 1,000 cu. ft. for an exposure of 2 hours at 80° F. The same dosage of ethylene oxide and of acrylonitrile caused injury to navel oranges and avocadoes. At a 2 lb. dosage ethylene dibromide caused injury to citrus fruits, while methyl bromide caused injury in some cases and not others. The latter injured avocadoes, as did a 50 : 50 mixture of acrylonitrile and carbon tetrachloride in 1 to 5 lb. dosages. With some exceptions the amount of bromine retained by citrus fruit fumigated with methyl bromide was generally proportional to the dosage used. Avocadoes similarly treated absorbed considerable amounts of bromine and 7 days later the flesh still retained 70%

of the total bromine absorbed. Data on the recovery of methyl bromide and ethylene dibromide from an empty fumitorium and from fumitoria containing different amounts of fruit are presented graphically.

2988. Manefield, T., and McDougall, W. A.
The citrus gall wasp and sodium fluoroacetate ("1080").
J. Aust. Inst. agric. Sci., 1951, **17**: 220-1, bibl. 6.

The citrus gall wasp, *Eurytoma fellis* Girault, has recently been an economic pest in some Queensland citrus areas. Previous efforts at chemical control by killing adults before and during oviposition have not given satisfactory results. The preliminary experiments recorded investigated the possibility of killing young larvae before gall formation began; of 4 stock spray materials used, only sodium fluoroacetate—1 : 500 (w/w)—was effective (60% over-all kill). It produced a marked difference in the amount of gall formation. A.C.S.

2989. Yust, H. R., Fulton, R. A., and Nelson, H. D.
Development and stability of resistance of California red scale to fumigation with hydrocyanic acid.
J. econ. Ent., 1951, **44**: 833-8, bibl. 8.

Laboratory trials have shown that the resistance to HCN fumigation of the original resistant strain of California red scale, *Aonidiella aurantii* [see *H.A.*, 14: 1844] was increased by repeated treatments. A culture of scales given 14 fumigations and then reared for 27 generations without fumigation was found to retain much of its increased resistance. Comparative trials with laboratory reared and newly collected scales of the same origin suggest that resistance in the field population had increased considerably as a result of fumigations made in the groves after the original stock had been obtained there.

2990. Omer-Cooper, J., and Whitehead, G. B.
Studies on the biological control of red scale in the Eastern Cape Province. 4. Other predators. 5. Ants and anthicids. 6. Other controlling influences. 7. Conclusions.
Citrus Gr., 1950, No. 200, pp. 6-7, bibl. 2; No. 201, pp. 6-7; No. 202, pp. 3-4; No. 203, pp. 5-6.

The first 3 parts of this article were abstracted in *H.A.*, 20: 3160. Part 4 gives a popular account of several predators, notably chrysopids, the moth *Eublemma costinacula* and certain mites. Part 5 discusses the positive relationship between ants and red scale and the negative relationship between the ant *Anaplolepis custodiens* and beneficial coccinellids. Part 6 discusses variations in scale infestation in relation to the age and condition of the trees. Part 7 is a general summary.

2991. Rebour, H.
Étude de la précision des différents tests de maturité des agrumes. **(A study on the precision of different maturity tests for citrus.)**
Fruits d'Outre Mer, 1951, **6**: 450-8.

In many countries maturity standards for citrus are based on the soluble solids: acid ratio, but in Morocco they have hitherto been based on acidity alone. It is now proposed that a uniform method be applied throughout North Africa, and the tests described here were made in Algeria to determine the reliability of the different measurements. Preliminary results suggest that the most important factor is the speed at which the tests are carried out. For oranges the soluble solids: acid ratio showed a clear advantage over the use of either of these measures singly. For mandarins the use of acidity alone would appear to be generally satisfactory, but it is suggested that the S/A ratio should be retained for the time being. For ordinary clementines, but not the Monréal clementine, the soluble solids altered so little over 2 months that a measure of acidity alone would be quite adequate.

2992. Sorber, D. G.
Orange maturity standard unchallenged after test of time.
Res. Achiev. Sheet U.S. Dep. Agric. **R.A.S. 150(C)**, 1952, pp. 2, bibl. 3.

A brief report on the development of the orange maturity standard (8 : 1 ratio of soluble solids to acid) since it was worked out by the Citrus By-Products Laboratory, Los Angeles, in 1914-16.

2993. Sinclair, W. B., and Crandall, P. R.
Alcohol-insoluble solids of juice vesicles and pulp of citrus fruit.
Bot. Gaz., 1951, **113**: 106-19, bibl. 17, being *Pap. Calif. Citrus Exp. Stat.* **702.**

Determinations were made of the various constituents in the alcohol-insoluble solids of the juice vesicles of Valencia and navel oranges and of the pulp of navel oranges and lemons. Certain relationships were also noted between the pectins and other constituents of the alcohol-insoluble solids.

2994. Melville, F.
Diphenyl wraps for oranges; storage experiments with Washington Navels.
J. Dep. Agric. W. Aust., 1952, **1** (n.s.): 44-6.

Experiments indicate that diphenyl wrapped oranges could be expected to open up in very good condition in Singapore. Apart from the reduction in losses of fruit, the general presentation is considerably enhanced. Considering the short period between packing and sale on the overseas market it is anticipated that the diphenyl taint would not be serious. Wax dips have also given good results.

2995. Smith, R. J.
Cartons for lemon shipments.
Calif. Agric., 1951, **5**: 11: 11, 14, illus.

Two types of corrugated carton, one with an open top and the other sealed, are described. They are much cheaper than the standard wooden boxes and have been favourably received by the trade.

2996. Schwob, R.
Un nouvel extracteur d'essence d'agrumes. **(A new machine for extracting essential oil from citrus.)**
Fruits d'Outre Mer, 1951, **6**: 407-11, illus.

A prototype machine operating on an entirely new principle has been tested in Morocco. The whole fruits are held by vertical arms which rotate them rapidly while abrasive points on moving arms work

their way over the whole surface. The recovery of oil is higher and the quality the same as in hand ecuelled oil. The fruit passes out of the machine whole and can be used for juice production. The machine, which is illustrated, can be adjusted to take any type or size of citrus fruit. It at present handles 4,200 fruits an hour, but could be speeded up if adapted for industrial purposes.—I.F.A.C.

2997. Brown, E., Coomes, T. J., and Islip, H. T.
Distilled lime oil from Zanzibar.
Colon. Plant Anim. Prod., 1951, **2**: 36-9.
With lime cultivation under consideration as a secondary Zanzibar industry and since the oil quality from limes of different types varies, testing of the oil from local seedling trees was necessary. Basically the sample submitted appeared to be of good quality; deficiencies noted in odour (due to high citral content) and flavour (lacking in " body ") were probably due to its experimental laboratory preparation. A.C.S.

2998. von Loesecke, H. W.
[Liquid wastes in the] citrus fruits industry.
Industr. Engng Chem., 1952, **44**: 476-82, bibl. 37, illus.
Increased processing of citrus fruits has created huge amounts of both solid and liquid wastes [in the United States], the former estimated to be about 3,500,000 tons annually and the latter 4 billion [U.S.] gallons. Considerable progress has been made in profitable utilization of the solid wastes and the more concentrated liquid effluents, but the more dilute effluents still offer pollution problems. [From author's synopsis.]

Dates.

(*See also* 3021k, m.)

2999. Institut des Fruits et Agrumes Coloniaux.
Le palmier-dattier dans le monde (*Phoenix dactylifera*). **(Distribution of the date palm.)**
Bull. Inf. Otus, 1950, **38**: 2: 2-20, bibl. 27.
The date palm requires a long period of heat during maturation, a moderate winter temperature, low rainfall and a relatively low humidity at the end of summer and in the autumn, absence of rain in spring when the flowers are beginning to form, abundant irrigation, abundant sunlight and absence of cold winds. The northern limits in Europe and Asia beyond which the palm does not fruit are given, and also the parts of the world in which it is cultivated. Cultivation could be expanded in the region round the Sahara and in the U.S.A.

3000. Jwaideh, S.
État actuel de la production dattière Irakienne. **(The present position regarding date production in Irak.)**
Bull. Inf. Otus., 1950, **38**: 1: 10-16.
Iraq has 30 million date palms. Of the 354 varieties recognized there 11 are commercially important. 40% of the total production is consumed locally. The names and destinations of the 9 main export varieties are given. Date syrup and date alcohol (for use in medicine, perfumery and in alcoholic drinks) are exported. All branches of the industry are under the guidance of the Iraq Date Society, a semi-governmental body.

3001. Ahmad, M. N., and Ullah, M. H.
Date cultivation in the Punjab (Pakistan).
Punjab Fruit J., 1951, **15**: 50: 9-14, map.
The date ranks next in importance to citrus and mangoes among the fruits of the Punjab. The present article gives a brief account of the areas in which it is cultivated and their climate, the soil requirements of the tree and its propagation, layout and planting, irrigation, manuring, intercropping, artificial pollination, ripening, curing, and pests and diseases. The main varieties are Hillawi and Khudrawi. Estimated costs of establishment and cultivation and of income over a period of years are set out.

3002. Bliss, D. E.
The development of the date industry in the United States. [Spanish summary 3 lines.]
Lilloa, 1949, **18**: 99-108, bibl. 44 [received 1952].
Production, processing, marketing and consumption are dealt with. Three basic trends in the development of the industry are noted: (*a*) the reliance of the industry on scientific research, (*b*) the standardization of varieties and grades of fruit, and (*c*) the development of cooperative marketing.

3003. Jamin, —., Kruger, —., and Pasquier, —.
La culture du palmier-dattier dans le Sud Tunisien. **(Date palm growing in southern Tunisia.)**
Bull. Inf. Otus., 1950, **38**: 1: 32-41.
The methods of establishment and maintenance of date palm plantations and varieties grown in the oases of southern Tunisia are described.

3004. Martel, —.
Création d'une palmeraie moderne en Tunisie. **(The creation of a modern date palm plantation in Tunisia.)**
Bull. Inf. Otus., 1950, **38**: 1: 42-5.
The method of establishing date palm plantations in southern Tunisia is explained under the following heads: irrigation and drainage, terracing, hole-digging and spacing at 8×8 or 9×9 m., external windbreaks of *Tamarix auriculata* or *Eucalyptus* and internal ones of *Saccharum biflorum*, water requirements, interplanting with vegetables and with lucerne for fodder or for green manure. The annual yield per tree after 10 years averages 15 kg. for export and 35 kg. second quality.

3005. Ramona, R.
Le problème de l'eau et de l'irrigation dans la production dattière en Afrique du Nord. **(Water and irrigation problems in North African date production.)**
Bull. Inf. Otus., 1950, **38**: 1: 46-57.
Date growing is the chief industry of southern Tunisia. The five major oases cover about 3,500 ha. and support 1,200 people per sq. km. Twelve of the varieties of *Phoenix dactylifera* are of economic value, the chief being the Deglet Nour. The sources of water are described. The amount of water used averages about one l. per ha. per second (31,104 cu. m. per ha. per annum). Methodical drainage is essential since stagnant water is inimical to date palms. Communal irrigation projects are assisted by the government.

3006. Monciero, A.
La fécondation mécanique du palmier-dattier. **(Mechanical fertilization of the date palm.)**
Bull. Inf. Otus., 1950, **38**: 1: 81-8.
A lance through which pollen is blown onto female inflorescences is described. Between 1945 and 1948 inclusive, trials were carried out at El Arfiane with different quantities of pollen, pollen of different ages, pollen collected from different male trees, and applications made once or twice when the inflorescences were at different stages of development. The results of these trials are summarized. In 1949 and 1950 further studies were made from which the following conclusions are drawn: Under normal climatic conditions the inflorescences set fruit satisfactorily up to 8 days after the opening of the spathes. The dilution of pollen with inert dusts is of no value. Biennial bearing is less marked among male than among female trees. More information is needed on the pollen grains, their germinating capacity and preservation, and studies on these aspects have been started. The general conclusion is reached that mechanical pollination gives as good a set as the traditional system, but that only the larger and more progressive growers will be able to take advantage of the method.

3007. Goosen, R. J.
The pollination of date palms.
Fmg S. Afr., 1952, **27**: 59-60, illus.
At Upington Experimental Station the pollen is collected, sieved and placed in a rubber bulb with a funnel-shaped opening. The opening is sealed with a cork through which a thin glass tube passes. A cloud of pollen is blown twice into each ♀ flower cluster, first when the spathe has just split and again 3-4 days later. The best time is the afternoon. If rain falls within 24 hours the process is repeated. Although good results have been obtained with pollen a year old fresh pollen should be used where possible. Generally 4-5 ♂ palms will supply sufficient pollen for 100 ♀ palms. To ensure controlled pollination these ♂ trees should be planted in isolation.

3008. Siraj-ud-Din.
Dates and their preservation.
Punjab Fruit J., 1951, **15**: 51: 23-5, bibl. 5.
Notes are given on sun-drying, dehydration, mechanical and on a home scale, and preservation in sugar. In a trial of the last of these methods dates that had been sulphured were successfully preserved in sugar solutions between 55° and 68° Balling.

Litchis.

3009. Li, L. Y., and Chou, C. Y.
A note on the Chen-Tze lychee of Hinghwa, Fukien. [Chinese, with English summary 8 lines.]
Fukien agric. J., 1950, **11**: 189-92, bibl. 8.
A brief account is given of the morphological characters of the Chen-Tze litchi and the physical and chemical measurements of its fruit, and its possible relationship to the Brewster litchi is discussed. A full account was given at the 61st annual meeting of the Florida Horticultural Society in October 1948.

3010. Singh, L. B.
Air layering in litchi without soil or water.
Curr. Sci., 1951, **20**: 102.
Terminal shoots 18 to 24 in. long of several litchi varieties were ringed. Rootone was applied to the upper side of the cut which was then covered thickly with damp sphagnum moss and wrapped in a plastic cover [presumably " polythene " or a similar material, see abstract 2899—Ed.]. Roots were visible after 1½ months and 2 weeks later the plants were detached and potted.

3011. Pal, B. P.
Dried litchis.
Indian Fmg, 1951, **1** (n.s.): 3: 13.
The results of a small scale trial in which litchis were sun-dried suggest that it should be easy to work out a cheap method for drying the fruit on a large scale.

Passion fruit.

3012. Li, L. Y., and Fang, C.
Trial culture of passion fruit, *Passiflora edulis*, in Foochow. [Chinese, with English summary ½ p.]
Fukien agric. J., 1950, **11**: 193-6, bibl. 6.
Plants raised from cuttings taken in the spring of 1947 have grown vigorously and fruited in 3 successive years. Apart from mild grease spot there has been little sign of diseases or pests. The plants withstood light frosts in the winters of 1948 and 1949. Analyses of fruits in 1949 and 1950 showed 39·8 c.c. juice per 100 g., 14·58% soluble solids, 2·12% total acid, and 2·7—3·5 mg. ascorbic acid per 100 g. juice.

3013. Entomological Branch, Department of Agriculture, N.S.W.
The passion vine leaf-hopper (*Scolypopa australis*).
Agric. Gaz. N.S.W., 1952, **63**: 96, illus.
These leaf-hoppers have recently appeared in great numbers, the principal damage being caused to passion vines in the coastal areas of New South Wales. Control is best effected when the leaf-hoppers are in their younger immature stages, and where infestation occurred during the previous season. Nicotine sulphate 1 fl. oz., white oil emulsion 8 fl. oz., water 4 gal. is now being replaced by 0·1% DDT emulsion.

Persimmons.

(*See also* 2050, 2058.)

3014. Vitagliano, M.
Sopra il processo di maturazione dei frutti di *Diospyros kaki* L. **(The ripening process in kaki fruits.)**
Ann. Fac. Agrar. Port., 1950, **18**: 140-51, bibl. 13.
The chemical analysis of 6 kaki varieties grown in the Italian province of Campania, 4 being seeded and 2 seedless, shows that the fruits when ripe for eating contain 65-70 g. of reducing sugars per 100 g. of dry matter. The seedless fruits are richer in sugars than

the seeded. All fruits tested were considerably lower in tannin than American grown kakis.

3015. MEZZETTI, A.
Notizie su di una nuova malattia del kaki diffusa in Italia. **(A new kaki disease widespread in Italy.)** [English summary 4 lines.]
Boll. Staz. Pat. veg. Roma, 1947 (issued 1950), **5**: 31-7, illus.

Orchards of kaki, *Diospyros kaki*, in the province of Imperia and in other parts of Italy are affected by a disease, which is characterized by a black discoloration of the leaf veins, and by a chlorosis and necrosis of the wood and bark of the shoots, twigs and branches. *Diospyros kaki* var. *lycopersicum* is particularly susceptible, while var. *costata* is more resistant. The etiology of the disease has not been determined.

Tung.

3016. WEBSTER, C. C.
The improvement of yield in the tung oil tree (*Aleurites montana*).
Trop. Agriculture, Trin., 1950, **27**: 179-220, bibl. 25.

The author reviews the work of the Tung Experimental Station, Nyasaland, much of which has already been summarized in a number of separate abstracts. The subject is dealt with in 4 parts: 1. Variation in seedling plantations; 2. The propagation of selected trees as buddings; 3. Improved types of seedling; and 4. Cultural and manurial experiments.

3017. SANDYS, J. A.
Orchard practice in apples and tung.
Nyasaland agric. quart. J., 1950, **9**: 47-56, bibl. 1.

Practice with tung in Nyasaland and with apples in England is compared. With tung clonal budding is still in the experimental stage but it is possible to obtain a wide gradation of clones. Optimum spacing and design of planting have not yet been settled but the square system is suitable for level land and contour planting of slopes is proposed. Yields are much lower than they should be owing to inefficient control of grass growth due to shortage of labour. The possibility of control by disc-harrowing, mowing and sheep-grazing and by a combination of these three methods is briefly considered.

3018. CHEN, S. M., AND LI, L. Y.
Differentiation of the flower-bud of tung trees in Foochow. [Chinese, with English summary ½ p.]
Fukien agric. J., 1950, **11**: 161-7, bibl. 9, illus.

Studies at the Fukien Christian University, Foochow, showed that the differentiation of pistillate flower buds of *Aleurites fordii* occurred between 1 July and 5 November, the first flowers opening on 1 April, and of *A. montana* between 22 July and 12 November, the first flowers opening on 8 April. With *A. montana* buds remained in the pre-determinate stage throughout the winter and developed rapidly into the full fruit bud stage between 23 February and 16 March.

Other crops.

3019. LI, C. S., CHANG, P. L., AND YANG, S. L.
The effect of stratification and other treatments on germination and establishment of Chinese olive seeds. [Chinese, with English summary 1 p.]
Fukien agric. J., 1950, **11**: 149-56, bibl. 6.

The Chinese white olive, *Canarium album*, and the Chinese black olive, *C. pimela*, are propagated by seed, air-layering and grafting. In studies on improving germination and the establishment of seedlings stratification in either moist sphagnum moss or river sand for 50-60 days under natural winter temperatures in Foochow gave the best results. Seeds treated with concentrated sulphuric acid for 5-20 min. or hot water at 30° C. for 1 min. followed by soaking in water for 24 hr. germinated 2-3 weeks earlier than stratified seeds, but the plants from the latter outgrew the others.

3020. KENT, N.
Investigaciones fitoquímicas sobre *Opuntia ficus indica*. Determinaciones de aminoácidos y glúcidos mediante nuevas técnicas de la bioquímica. **(Chemical investigations on *Opuntia ficus indica*. Determinations of amino acids and sugars by new biochemical techniques.)** [French summary ⅓ p.]
Lilloa, 1949, **18**: 91-6, bibl. 7, illus. [received 1952].

A preliminary study was made of the soluble proteids of *Opuntia ficus indica* and of the possibility of using the juice of the cactus as a culture medium for certain industrially important microorganisms. Rapid development was obtained of *Penicillium notatum*, *Aspergillus* spp., *Lactobacillus bulgaricus* and *Mucor rouxii*.

Noted.

3021.

a BENDALE, J. R., NARAYANA, N., AND KIBE, M. M.
Trace element contents of black cotton soils of a few citrus-growing tracts of the Bombay State.
Poona agric. Coll. Mag., 1951, **42**: 3-10, bibl. 22.
Mn, Cu, Zn and B contents.

b BRICHET, J.
La conservation de l'humidité utile dans le sol des orangeries adultes. **(The conservation of soil moisture in mature orange groves.)**
Fruits et Prim., 1951, **21**: 77-80.

c DIMITRI, M. J., AND RIAL ALBERTI, F.
Nueva variedad hortícola de *Eucalyptus camaldulensis* y polimorfismo observado en la especie. **(A new horticultural variety of *Eucalyptus camaldulensis* and the polymorphism observed in this species.)** [German summary 4 lines.]
Lilloa, 1949, **17**: 5-10, bibl. 2, illus. [received 1952].

d EBELING, W.
Citrus pests in California.
Calif. Citrogr., 1951, **37**: 4-5, 20, 22-4, 50, 81-4, illus.
A historical review.

e ELMER, H. S., EWART, W. H., AND CARMAN, G. E.
Abnormal increase of soft (brown) scale.
Calif. Citrogr., 1951, **37**: 34-5.
For similar article see *H.A.*, 22: 1824.

f ELMER, H. S., EWART, W. H., AND CARMAN, G. E.
Soft brown scale on citrus.
Calif. Agric., 1952, **6**: 1: 10, 13.
Scales increase following parathion sprays.

g HIBON, J.
Les conséquences de l'excès d'eau et les moyens d'y remédier dans les orangeraies. **(The effects of waterlogging in orange groves and methods of curing it.)**
Fruits et Prim., 1951, **21**: 115-16.

h HOOS, S.
Lemons and lemon products.
Calif. Agric., 1952, **6**: 1: 2.
Trends in marketing in California.

i KUNEYL, H.
L'arboriculture en Argentine. **(Fruitgrowing in Argentina.)**
Fruits et Prim., 1951, **21**: 81-90, illus.
Citrus, olives, vines, etc.

j KUNEYL, H.
L'Argentine et le quick-decline. **(Argentina and quick decline.)**
Fruits et Prim., 1951, **21**: 117-20, illus.

k LANGRONIER, C.
État actuel des palmeraies du Sud Algérien. **(Present state of date palm plantations in southern Algeria.)**
Bull. Inf. Otus., 1950, **38**: 1: 98-102.
Including yields per tree and export figures.

l MCGILLIVRAY, K. D., AND GREAVES, H. M.
Poultry in the citrus orchard.
Agric. Gaz. N.S.W., 1951, **62**: 647-51; 1952, **63**: 31-6; 53-4; 77-81; 100-1, bibl. 4, illus.

m MONCIERO, —.
Contribution à l'étude du palmier-dattier. **(A contribution to the study of the date-palm.)**
Bull. Inf. Otus., 1950, **38**: 1: 74-80.
See *H.A.*, 22: 1840.

n OPPENHEIMER, H. R.
Geobotanical research in Palestine 1938-1950.
Vegetatio, 1952, **3**: 301-20, bibl. pp. 5.

o RAO, A. R.
Some leaf abnormalities of *Aegle marmelos* Corr.
Curr. Sci., 1951, **20**: 302-3, bibl. 7, illus.

p S., E.H.G.
Citrus pectin: production possibilities.
Colon. Plant Anim. Prod., 1951, **2**: 124-7, bibl. 12.
A review of the literature.

q SWIFT, L. J.
Isolation of β-sitosteryl-D-glucoside from the juice of Florida Valencia oranges (*Citrus sinensis*, L.).
J. Amer. chem. Soc., 1952, **74**: 1099-1100, bibl. 7.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 2123, 2146, 2917, 2920, 2921, 3189, 3195, 3196, 3219, 3224, 3237, 3238, 3247.)

3022. LÉONARD, J.
Aperçu préliminaire des groupements végétaux pionniers dans la région de Yangambi (Congo Belge). **(A preliminary survey of pioneer plant associations in the Yangambi region (Belgian Congo).)**
Vegetatio, 1952, **3**: 279-97, bibl. 13, illus.
A concise, descriptive classification based on the floristic-ecological method of Braun-Blanquet and Lebrun is given of the different pioneer plant associations that colonize open land in the region of Yangambi, near Stanleyville. A full account of the work is in course of preparation.—I.N.É.A.C.

3023. COOLHAAS, C.
De cultuur van enige meerjarige gewassen in Suriname en het daaraan te verrichten onderzoek. **(The cultivation of perennial crops in Surinam and the problems needing investigation.)** [English summary ¾ p.]
Landbouwk. Tijdschr., 1951, **63**: 284-92.
Modern methods of land reclamation have made it possible to create polders suitable for mechanized rice cultivation in many of the swamps of the alluvial coastal region of Surinam. The old polder estates were cultivated on the ridge system, and this makes mechanized rice production difficult. The possibility of using this land for tree crops is reviewed, and the prospects for cacao and coffee seem good, although much experimental work is needed. In certain areas there are possibilities for the mechanized production of ground nuts and cigar tobacco. In the inland forest zone there appear to be reasonable prospects for the production of oil palms and cacao.

3024. ROE, F. W.
The natural resources of Sarawak.
Govt. Printing Office, Kuching, Sarawak, 1952, pp. 38, illus., Straits $0.50 or 1s. 2d.
Accounts prepared by members of the natural resources board together with general information obtained from official records have been used by the author in compiling this report. A section on agricultural resources (pp. 8-13) contains notes on the chief crops, rice, rubber, sago, pepper [*Piper*] and coconuts. Other crops grown in small quantities include derris, pine-apples, tobacco, and coffee. Experimental plantings of cacao show promise on the better types of land.

The soils of the interior are, however, generally very thin and poor in texture.

3025. HENRY, B. G. C.
Report on the crop and livestock census, 1950 [in British Guiana].
Econ. Bull. Dep. Agric. Brit. Guiana **4**, undated, pp. 8.
Includes acreages in sugar cane, root crops, coconuts, coffee, cacao, rubber and fruits.

3026. SIMMONDS, N. W.
Notes on field management at the botany department of the Imperial College of Tropical Agriculture, Trinidad.
Trop. Agriculture, Trin., 1951, **28**: 70-5, illus.
Four distinct aspects are described. 1. *A banana greenhouse* built locally in 1949-50 is described with the aid of a plan and perspective drawing. 2. *A three-wheeled hand cart* on rubber tyres, also designed and built locally and found useful for carrying materials to and from the field, is illustrated. 3. *The management of Gliricidia sepium as a shade tree.* It has been found that, by pollarding the trees and taking off the side shoots early in the wet season (July) and repeating this later in the wet season (Nov.-Dec.), the plants can, to a great extent, be prevented from flowering and made to retain some leaves throughout the dry season, thus providing some shade for cacao and bananas at a critical period. 4. *Sawdust compost.* The compost used is composed of sawdust, mainly of West Indian cedar, 16 cu. yd., pen manure 1 cu. yd., fresh elephant or Guatemala grass 1 cu. yd. and ammonium sulphate 20 lb. After 9 months an excellent potting soil for bananas and cacao can be made by mixing 1 bucketful of compost with 2 bucketfuls of neutral or slightly acid soil, 2 oz. ammonium sulphate and 1½ oz. potassium sulphate. The mixture is left under cover for a week before use.

3027. PAUL, W. R. C.
Notes on legumes—I.
Trop. Agriculturist, 1951, **107**: 15-20, bibl. 11, illus.
Among several leguminous trees and cover crops described and illustrated are *Stizolobium aterrimum*, the Mauritius velvet bean, which in trials at Peradeniya has proved an exceptionally vigorous ground cover, *Sesbania cinerescens* which is useful as a shade tree for tea, and *Indigofera teysmanii* which is considered suitable as a shade tree for tea, coffee or cacao or as a windbreak.

3028. LARUE, C. D.
Root-grafting in tropical trees.
Science, 1952, **115**: 296.
In a cursory examination of trees in Puerto Rico natural root grafts were found occurring in 34 genera belonging to 18 different families. Such grafts were particularly common in mangoes, and *Ficus nitida*. Other genera included *Aleurites*, *Artocarpus*, *Citrus*, *Coffea* and *Diospyros*.

Bananas.

3029. BOREL, E., AND PÉLEGRIN, P.
La culture du bananier au Cameroun. **(The cultivation of bananas in the French Cameroons.)**
Fruits d'Outre Mer, 1951, **6**: 421-7, map.
The export of bananas from the French Cameroons nearly trebled between 1947 and 1950 and amounted to 49,000 tons in 1950. This article describes the distribution of plantations, most of which are between 50 and 200 ha. in size, the nature of their soils, the climate, the varieties grown, methods of land clearing, spacing and planting, management, rotations, harvesting, diseases and pests and yields. It is the only French territory in which the banana industry is based almost entirely on the Gros Michel, though neither the plants nor their bunches generally reach the sizes reported for this variety in central America. For some years past, increasing use has been made of cover crops notably *Pueraria javanica*. *Cercospora musae* and *Stachylidium theobromae* are the only diseases of note at present, and among pests, the banana borer is absent. The frequent occurrence of tornados is mainly responsible for low average yields.—I.F.A.C.

3030. CHAMPION, J.
Aperçus sur la culture du bananier nain en Guinée française. **(Notes on the cultivation of the dwarf banana in French Guinea.)**
Fruits d'Outre Mer, 1951, **6**: 466-74, bibl. 3, illus., and 1952, **7**: 9-20, illus.
The banana industry of French Guinea is based entirely on the dwarf banana, *Musa sinensis*. In this popular but detailed account its culture is discussed under the following main headings: (1) the plant and its characteristics; (2) its environment, particularly soil and climatic conditions; (3) methods of cultivation, including the bringing of new land under cultivation, spacing, mulching, surface and sprinkler irrigation, manuring, pruning, diseases and pests; and (4) economic factors affecting the industry. The account is intended to serve as an introduction to papers on particular subjects that will be published later.

3031. CHANDRARATNA, M. F., AND NANAYAKKARA, K. D. S. S.
Cultivated varieties of banana in Ceylon.
Trop. Agriculturist, 1951, **107**: 70-91, bibl. 11, illus.
Among the banana varieties in cultivation in Ceylon more than 100 Sinhalese and Tamil names of 29 varieties (11 illustrated) have been recognized, most of which appear to be indigenous. A key is followed by detailed descriptions of each of the varieties.
A.C.S.

3032. BAKER, R. E. D., AND SIMMONDS, N. W.
Bananas in East Africa. Pt. II. Annotated list of varieties.
Emp. J. exp. Agric., 1952, **20**: 66-76, bibl. 1.
The arrangement of the list is by localities, 2 in Kenya, 2 in Uganda, 3 in Tanganyika and 1 in Zanzibar. Native and alien varieties are distinguished. Entries consist of local names, their meaning, usage, distinctive fruit characters and identity or synonymy where known. [For part 1 see *H.A.*, 22: 1863].

3033. SIMMONDS, N. W., AND SHEPHERD, K.
An Asian banana (*Musa acuminata*) in Pemba, Zanzibar Protectorate.
Nature, 1952, **169**: 507-8, bibl. 4.
Samples of a species of banana found on the island of Pemba were identified at the Imperial College of

Tropical Agriculture, Trinidad, as the Asian banana, *Musa acuminata*. Although phenotypically resembling the Selangor form of the species, pollination experiments indicate that the Buitenzorg form is its nearest relative.

3034. HENDRIX, J. W.
Influence of certain small quantities of 2,4-D on bananas.
Bull. Hawaii agric. Exp. Stat. **106**, 1952, pp. 20, illus.

Applications of 2,4-D at 2·6 p.p.m. (0·6 g. acid per acre) and 5·1 p.p.m. (1·6 g. acid per acre) produced no detectable response on Cavendish bananas. A single application of a 10·8 p.p.m. solution (11·2 g. per acre) also produced no symptoms of damage, although a second application at this strength caused midvein russetting; plant growth, yield and rate of fruit maturity were unaffected. When 2,4-D was applied at a rate of 91·8 g. acid per acre in a 104 p.p.m. dilution, midvein russetting, pseudostem buckling and cracking, sucker distortion, fruit disfigurement, finger contortion, an increased rate of ripening, increased stalk fragility, lowered yield and increased sucker formation occurred. This damage resulted in the death or destruction of 89% of the sprayed plants, 31% of the suckers developing during the first 2 months after treatment and 86% of the sprayed fruit. The suckers developing for 3 months after such an application of 2,4-D were considered undesirable for propagation; after this time they appeared to be equal in all respects to suckers arising from untreated clumps.

3035. CANN, H. J.
Bunchy top disease of bananas " at all time low " in N.S.W.
Agric. Gaz. N.S.W., 1952, **63**: 73-6, bibl. 2, illus.

Since bunchy top became a major disease in New South Wales a constant effort has been made to control it, and the reduction in its incidence is an outstanding example of combined grower-Department of Agriculture plant disease control. The vector of the virus is the banana aphid, *Pentalonia nigronervosa*. The measures adopted for control are described. The movement of banana plants in and between quarantine areas is regulated and it is necessary to have a permit to plant or move any banana suckers. Bad bunchy top plantations are inspected every three weeks, and areas known to be almost free about once in 3 months. All bunchy top plants are sprayed with power kerosene as soon as they are discovered; this kills any aphids present and so stops the rapid spread of the disease. After spraying it is the grower's responsibility to destroy the plant by digging it out and cutting it into small pieces. Bunchy top control now costs banana growers approximately £28,000 per year.

3036. ANON.
Squirter disease of bananas controlled by fungicidal dip.
Agric. Gaz. N.S.W., 1952, **63**: 87-9, illus.

This disease, caused by the fungus *Nigrospora spherica*, may be controlled by dipping the cased fruit for ½ min. in Shirlan A.G. at 1 pt. to 30 gal. or Salicide and Shirlan W.S. at ½ lb. in 30 gal. The dipping solution should be freshly prepared each day.

Cacao.

(*See also* 2277, 3170b, g, i.)

3037. BOWMAN, G. F.
The problem of selection in cacao.
Cacao, 1951, **2**: 13/24: 1-6, bibl. 7.

Methods used in the past for selection of superior types of cacao in the field are discussed briefly. The problem of recognizing such trees with any certainty among very large populations remains unsolved. This is illustrated by the tabulated monthly records of pods hanging on the 25 highest yielding trees among 1,082 trees on La Lola farm, Costa Rica; monthly variations were very high and 6 out of the 10 highest yielding trees never ranked first during any one month. In an attempt to find other macroscopic characters that might be associated with high yields García* studied the 25 highest and lowest yielding trees among this population of 1,082. There were significant differences in means in favour of the high yielding group with respect to 6 criteria associated with vigour, namely, vigour of main limbs, height of tree, diameter of canopy, thickness of bark, trunk diameter and number of basal suckers. But as some of the low yielders also showed great vigour it remains uncertain how far vigour reflects inherent yield capacity or may result from other influences which themselves may cause relatively high yields. It is suggested that the possible value of such morphological characters should be further examined by similar studies in other cacao producing countries.

3038. WILSON, J.
The breeding of cacao.
J. agric. Soc. Trin. Tob., 1951, **51**: 303-14.

The problems and methods of plant breeding as applied to cacao are discussed, and the programme of the Cacao Research Scheme in Trinidad is outlined.

3039. EVANS, H.
Some problems in the physiology of cacao.
J. agric. Soc. Trin. Tob., 1951, **51**: 277-92.

Two lines of work are described: I. Deficiency symptoms that have been found in cacao are described for N, P, K, Mg, Ca, S, Fe, Mn, Cu, Zn, B, and Mo, and toxicity symptoms for plants that have received excessive amounts of salts, such as chlorides and sulphates, or B, Zn, Mn and Al. In the field in Trinidad N deficiency has become more pronounced with the tendency to use lighter shading, and P, K and Mg deficiencies occur occasionally, while among the trace elements Fe deficiency is widespread and deficiencies of Mn, Cu and Zn have been identified in a few cases. The causes of trace element deficiencies and their effects on tree health are discussed. In considering possible curative measures Fe provides the most difficult problem; apart from improved cultural methods and spraying with iron sulphate when this is practicable the selection of clones which show resistance to Fe deficient conditions such as I.C.S. 36, 60 and 95 is suggested [see also *H.A.*, 21: 1026]. II. A shade experiment is described in which cacao is being grown under artificial shade, letting through 15%, 25%, 50%, 75%, and 100% of daylight. Sub-treatments include mulching, differential fertilization and

* García R., F. Estudio de relaciones entre caracteristicas estimables y producción en arboles de cacao. *Thesis Interamer. Inst. agric. Sci., Turrialba* 1950.

3 clones. Results during the first year show that cacao made the best growth at 25 to 50% sunlight, but plants receiving 50% were of better shape. As the plants became bigger and auto-shading developed, the 75% light plot improved its position. With increasing light intensity the need for N fertilization became more apparent. Mulch had a beneficial effect in the early stages, but once active breakdown began marked N deficiency symptoms developed in the high light plots.

3040. Bowman, G. F.
Propagation of cacao by softwood cuttings.
Cacao, 1950, **2**: 9: 1-6, sketch plan.

A detailed and practical article on the selection, preparation and treatment of cuttings and on the construction and use of 3 types of propagator. The writer stresses that successful rooting depends primarily on ample light plus continuous, very high relative humidity to prevent defoliation. Whilst the Trinidad type solar propagator has greatly helped to initiate the use of rooted cuttings, it is not suitable for ordinary growers on account of expensive construction, the labour required for operation and its sensitivity—the light and humidity being always at the extreme limits of tolerance. The use of two alternative types designed at the Cacao Center, Costa Rica, is described: (1) The Turrialba Propagator—for small farmers requiring only a few hundred cuttings per year; it is economical in cost and labour, but rooting success is variable (about 50%) and rooting slow (about 6 weeks); essentially it is a frame of boards with a tight hinged lid, covered with Celloglass, like a low roof and is placed over a raised nursery bed under high shade; watering is only done 2 or 3 times a week and hardening is obtained by gradually raising the lid after 5/6 weeks; the frame is then moved to a new location, the plants being left for 2/3 months before transplanting to the field. (2) The Turrialba Continuous Spray Propagator—recommended for larger scale propagation; this requires water under pressure. The cuttings are rooted in transportable slatted-bottomed boxes, filled with well washed sawdust. They are placed on a stone rubble type floor divided into 3 sections, the centre section being shaded with a slat roof; each section has an overhead spray operated from about 6.30 a.m.-5.30 p.m. except in rain or fog; one section is filled every 2 weeks and after 4 weeks in the full light the boxes are moved into the shaded section for 12 days hardening (when watering is gradually reduced) before transfer to a shaded nursery bed. A.C.S.

3041. [Malaya.]
Notes on current investigations, April to June, 1951. Cacao.
Malay. agric. J., 1951, **34**: 134-5.

Further experience of budding cacao has shown that stocks require different treatment according to whether they are in baskets or in the field. In the field the stock should be bent over or ring barked if too large. If it is cut back too quickly it dies. A stock budded in a basket should be cut back to the bud patch as soon as a union has been established, because bending it leads to dormancy in the bud. By using these techniques 70 to 90% success has commonly been obtained.

3042. Bartolomé, R.
The effect of fertilizer application on the incidence of cherelle wilt of cacao in Costa Rica.
Cacao, 1951, **2**: 13/24: 6-10, bibl. 8.

In an experiment at the Interamerican Cacao Center Experimental Farm, La Lola, Costa Rica, 7 NPK fertilizer treatments had no appreciable effect on the incidence of cherelle wilt. It is pointed out that this lack of response may be due in part to the absence of a dry season and to the high inherent fertility of the soil. Nearly all the cherelles that wilted had lesions apparently caused by insects or fungi.

3043. García B., C.
Efectos del ácido para-clorofenoxiácetico en el cuajamiento de las flores del cacao.
(The effect of para-chlorophenoxyacetic acid on the set of cacao flowers.)
Not. agron. Palmira, 1951, **4**: 58.

Para-chlorophenoxyacetic acid, in concentrations of 25 or 50 p.p.m., was applied in November to grafted cacao plants of the clone S.C.P.6. On the untreated control trees none of the flowers set fruit, whereas on the treated trees a 0·38–1·5% set was obtained, depending on the concentration used. In an earlier experiment made at a different time of year a set of 1-2% in the controls was raised to 3-13% by treatment with this growth substance, a fact which indicates the need for determining the optimum time of year for treatment.—Palmira agric. Exp. Stat.

3044. McLaughlin, J. H.
Some symptoms of *Phytophthora palmivora* Butl. infection on *Theobroma cacao* L. in Costa Rica.
Cacao, 1950, **2**: 10: 3-5, bibl. 1.

Additional information is given, mostly obtained in Costa Rica, to supplement the still incomplete knowledge of the symptoms of phytophthora infection on cacao. Symptoms of the following are described: pod rot—small pods (cherelles) are mostly attacked near the point and half grown and larger pods usually between the point and pedicel ends; chupon blight and canker; premature ripening—somewhat similar in appearance to cherelle wilt but occurring in fairly mature pods due to the floral cushion being attacked; leaf and tip blight—phytophthora has been shown to be the organism mainly responsible for this blight, which is very similar to chupon blight and canker but occurs on new growth of branches; cherelle wilt—apart from some wilting due probably to physiological causes, phytophthora attack on the pedicels is undoubtedly an important cause, though other fungi are probably also involved; and seedling blight. A.C.S.

3045. Hanna, A. D., Heatherington, W., and Judenko, E.
Control of the mealybug vectors of the swollen shoot virus by a systemic insecticide.
Nature, 1952, **169**: 334-5.

Detailed field and laboratory trials of the systemic insecticide CR409 (bisdimethylamino-fluoro-phosphine oxide) for the control of mealybugs, *Pseudococcus njalensis* and *P. citri*, on cacao showed that application to the soil directly around the trunk is the most effective method of treatment. Three applications at 8 week

intervals kept the mealybug populations at a very low level and did not appear to have any significant effect on insect pollinators. Reduction of parasites and predators was probably due to lack of mealybug hosts to sustain them.—W. Afr. Cacao Res. Inst., Tafo.

3046. Kuppers, J. R.
Changes in the absolute dry matter content of cacao during fermentation.
Trop. Agriculture, Trin., 1951, **28**: 53-6, bibl. 2.

A re-examination of the data on dry weight changes during fermentation presented by Humphries (1944) [see *H.A.*, 15: 292], indicated that further data were desirable. An experiment is described in which a logarithmic relationship of loss of dry matter to period of fermentation with a correlation coefficient of −0·978 (P=0·01), was established. [Author's summary.]

3047. Islip, H. T.
Cocoa beans from Malaya.
Colon. Plant. Anim. Prod., 1951, **2**: 40-5.

Size and condition of the samples did not permit definite conclusions regarding quality, but the small average size of the beans suggested that a small bean may be characteristic of Malaya. A.C.S.

Cinchona.

(*See also* 3171p.)

3048. Love, H. T., Cowgill, W. H., and Hopp, H.
Variability and estimation of the quinine content of cinchona clones.
Proc. Amer. Soc. hort. Sci., 1951, **58**: 109-14, bibl. 6.

1. Former methods of sampling and analyzing commercial plantations of vegetatively propagated cinchona clones in Guatemala were expensive and gave conflicting results. 2. Using a fluorometric assay method, a study of 46 populations showed there was considerable variability in quinine between clonal populations, and even within clonal populations. 3. Based on a study of three populations, a simplified method for estimating quinine in cinchona populations was developed, using core sampling and fluorometric assay. [Authors' summary.]

Coconuts.

(*See also* 3170h, m, n, r, 3171f, i, n.)

3049. Gopalan, K., and Venkataraman, M. S.
Cost of cultivation of coconut in Travancore.
Indian Coconut J., 1951, **4**: 57-158, illus.

Travancore-Cochin State accounts for about 43% of the total coconut area in India. This extensive investigation, conducted on the basis of random sampling, covered the whole of the Travancore-lowland coastal belt, midland area (mostly river valleys) and the hill slopes and valleys of the mountainous region. The data obtained are also compared with those of a previous investigation in Cochin; the Cochin study was, however, less representative since it related mainly to the better yielding coastal areas. All the Travancore costings given relate to the years 1940, 1945 and 1949, and give in detail by districts the itemised cost per acre up to bearing age, ranging from an average total of Rs. 627 in 1940 (including land cost Rs. 463) to Rs. 1,643 in 1949 (including land cost Rs. 1,064). The itemised annual costs of maintenance per acre of bearing trees range from an average total of Rs. 28 in 1940 to Rs. 89 in 1949. On the basis of 1,000 nuts (c.f. average annual yield in Travancore is 1,917 nuts per acre) for the years 1940, 1945 and 1949, costs of production averaged Rs. 39, 85 and 108 against values of Rs. 26, 114 and 200 respectively; increased returns to growers have therefore more than offset higher costs of production.

All the principal cultural operations are described. On an average it takes 8/10 years to bearing with maximum yield from about the 15th year, the economic yielding life being some 70 years; the average planting rate is 70 per acre. Root and leaf diseases are widespread in Travancore though not in Cochin, but control measures are not yet widely undertaken. Chemical fertilizers are rarely applied to bearing trees, which often only receive additions of silt; with young trees, lime, salt, ash, and cattle and fish manures are also applied, apart from green manuring. Depth of planting of seedlings varies from planting on 2/3 ft. mounds in land under reclamation, ground level planting in the coastal area, to planting 3/4 ft. deep in pits (later gradually filled up) in hill regions; the need for avoiding root exposure is stressed. The planting pits are often burnt to prevent white ant attack and sand, salt, dung and ash are added to the soil, usually in insufficient quantities. Watering of seedlings varies with soil type, availability, etc., an average being on alternate days in dry weather the first year and once or twice weekly in the subsequent 2/3 years. Where proper tree spacing permits and in young gardens, cassava is commonly also grown and its cultivation and manuring and residual matter greatly assist the coconuts; other crops interplanted are arecanut palms, pepper, jack and other fruit trees. A.C.S.

3050. Kaul, K. N.
A palm fruit from Kapurdi (Jodhpur, Rajasthan Desert) *Cocos sahnii* sp. nov.
Curr. Sci., 1951, **20**: 138, illus.

The discovery of a fossil *Cocos* fruit at Kapurdi confirms the author's belief that the genus *Cocos* was to be found in India in the early tertiary (Eocene) period.

3051. Ambrose, C.
Vertical or horizontal ? Which is the correct method of planting out seed-nuts.
Ceylon Coconut Quart., 1951, **2**: 169-71, illus.

In two experiments in different nurseries seed coconuts planted on their sides produced seedlings that were markedly superior to those from nuts planted with their eyes upright. Among the latter some died and many showed leaf corrugations.

3052. Cheyne, O. B. M.
" Cruciform " planting holes for hard ground.
Ceylon Coconut Quart., 1951, **2**: 179, illus.

It is recommended that to aid root spread of coconut seedlings in hard soils the main hole dug 3×3×3 ft. should be supplemented on each of its 4 sides by an additional hole cut $1\frac{1}{2}\times1\frac{1}{2}\times1\frac{1}{2}$ ft.

3053. SALGADO, M. L. M.
Soil potash and its availability in relation to potash manuring of coconuts.
Trop. Agriculturist, 1951, **107**: 92-9, bibl. 7.
In general, most coconut soils would be expected to be normally deficient in potash and this has been confirmed with yield responses over 14 years in a manurial experiment on an average coconut soil. But responses will not be obtained if reserves of exchangeable potash are high, as in some red loams and heavy alluvial soils, as has been indicated by lack of significant response in another manurial experiment during the past 6 years (1 lb. and 2 lb. K_2O per palm). Responses may also not be obtained in deep well drained soils which, whilst not high in available potash, permit more extensive root growth. Striking recent data are given from the two above-mentioned manurial experiments, showing a high correlation between yield and potash content of the coconut water; it is hoped that analysis of coconut water will prove a satisfactory quick routine method of studying the potash status of coconut soils. A.C.S.

3054. SANKARASUBRAMONY, H., PANDALAI, K. M., AND MENON, K. P. V.
The manganese content of soil and plant tissue in relation to the root and leaf diseases of the coconut palm.
Indian Coconut J., 1951, **4**: 165-70, bibl. 5.
The desirability of this study was indicated by recent investigations, relative to disease, in Jamaica with coconuts and in Bombay with the areca palm. As in Jamaica, the results obtained showed no correlation between disease incidence and manganese content of the soils and palm tissues, the content in both ranging widely from both healthy and diseased sources; healthy full-bearing palms were found in soils with both very high and very low manganese content. A.C.S.

3055. CUTTER, V. M., JR., WILSON, K. S., AND DUBÉ, J. F.
The endogenous oxygen uptake of tissues in the developing fruit of *Cocos nucifera*.
Amer. J. Bot., 1952, **39**: 51-6, bibl. 5, illus.
The endogenous oxygen consumption of various tissues of the developing and mature coconut has been measured. The highest rates of oxygen consumption are encountered in the youngest meristematic stages of development, in regions of greatest enzymatic activity in the non-storage tissues, and in the youngest embryos. In the development of the endosperm, cellular differentiation and the synthesis of storage substances does not seem to be accompanied by increased aerobic respiration. [Authors' summary.]—Yale University, New Haven, Conn.

3056. WILSON, K. S., AND CUTTER, V. M., JR.
The distribution of acid phosphatases during development of the fruit of *Cocos nucifera*.
Amer. J. Bot., 1952, **39**: 57-8, bibl. 4.
The distribution and activity of acid phosphatases and inorganic phosphate have been surveyed throughout the development of the coconut. The highest acid phosphatase activity is encountered in the meristematic nucellus and the outer layers of the haustorium of the embryo. This activity is associated with those tissues which show the highest concentrations of inorganic phosphate. Throughout its development the endosperm shows relatively low concentrations of inorganic phosphate and acid phosphatase activity, but the onset of cellular differentiation in this tissue is accompanied by a rise in phosphatase activity. [Authors' summary.] —Yale University, New Haven, Conn.

3057. O'CONNOR, B. A.
Premature nutfall of coconuts in the British Solomon Islands Protectorate.*
Agric. J. Dep. Agric. Fiji, 1950, **21**: 1-2: 21-42, bibl. 12, illus.
This is a full account of the investigation carried out in 1948 (apart from a check inspection in 1950) jointly with R. Leach [see *H.A.*, 20: 401 and 2008]. The conclusions drawn from investigations before the war were confirmed, viz. premature nutfall is caused by the coreid bug *Amblypelta cocophaga*; this bug is driven out by the ant *Oecophylla smaragdina subnitida*, the ant *Anoplolepis longipes* having also some beneficial effect. The ants *Pheidole megacephala* (formerly *P. oceanica*) and *Iridomyrmex myrmecodiae*, which cannot themselves suppress *Amblypelta*, tend to drive out the beneficial species. This investigation proved that *Oecophylla* could be successfully introduced and established for *Amblypelta* control in the presence of *Pheidole* if enabled to by-pass the *Pheidole* around the base of palms by means of fallen fronds rested butt downwards against the trunks or other vegetation. It is, therefore, undesirable that plantations should be kept very clean and the planting of creeping cover-crops is also suggested. Since *Iridomyrmex* nests in the crown, in trunk depressions and around the base, it is unlikely that *Oecophylla* can be similarly established in an area where *Iridomyrmex* is dominant; possible *Amblypelta* control measures in such cases are the introduction of parasites (such as the tachinid, *Trichopoda pennipes*) or, failing that, power-dusting to kill both ants and bugs followed by the introduction of *Oecophylla*. An appendix by Leach details the injury caused by *Amblypelta*. A.C.S.

3058. SIMMONDS, H. W.
Premature nutfall on Taveuni.
Agric. J. Dep. Agric. Fiji, 1951, **22**: 22-4.
Premature fall of coconuts of two sizes on Taveuni Island in 1951 was due to several causes. Much of the fall of nuts up to egg size was due to the palms' sheer inability to mature all the nuts in the abnormally heavy heads (following upon the 1949 hurricane); another factor was an unusually severe attack by the moth *Acritocera negligens*. Fifty per cent of the fall of nuts 2 months before maturity was due to rats; the balance appeared to be chiefly due to competition from guavas and weeds, to the constantly moist soil and to a lesser extent to an abnormally severe attack by the beetle *Diacalandra taitensis*.

3059. NIRULA, K. K., ANTONY, J., AND MENON, K. P. V.
Investigations on the pests of the coconut palm. 2. The coconut caterpillar *Nephantis serinopa* Meyr. Parts I and II.
Indian Coconut J., 1951, **4**: 217-34, bibl. 21, illus.
These are the first recorded insecticidal trials in India for control of this fairly widespread major pest, which

* Omitted in error from *H.A.* 21.

is particularly serious during the hot months. In the past, cutting and burning infested leaves has not proved effective and biological control measures have only given partial and temporary success. Following a description of the life history and habits of the moth, results are given showing satisfactory control with a spray of 0·2% DDT (0·1% serving for prophylactic purposes). After 3 sprays, in May, July and November, the pest was completely suppressed. The 0·2% concentration of DDT did not affect pupating caterpillars and pupae, but this incidentally ensured a survival of pupal and pre-pupal parasites. Nut yield in the treated block more than doubled in the year following the spray treatment. A.C.S.

3060. Nirula, K. K., Antony, J., and Menon, K. P. V.
Investigations on the pests of the coconut palm. (2) Comparative studies with different insecticides in relation to the control of the grubs of the rhinoceros beetle (*Oryctes rhinoceros*, L.).
Indian Coconut J., 1951, **4**: 49-56, bibl. 5.

Two types of benzene hexachloride, which substance these writers previously (1950) recommended for control, were compared in various strengths in laboratory and field trials with toxaphene, DDD, paris green, lead arsenate, calcium arsenate and sodium arsenite. A BHC spray was found to be most suitable and economic; 0·01% (13% gamma isomer) gave quite satisfactory results, with a good residual effect after 6 months, when applied to the various breeding materials—cow dung, farmyard manure and vegetable matter; in this concentration the adult beetle is not repelled. Arsenic compounds and toxaphene were quite toxic at higher dosages, though not so effective at 0·01%; DDD was generally not sufficiently lethal; the arsenic compounds are not recommended on account of their poisonous properties. A.C.S.

3061. Nirula, K. K., Antony, J., and Menon, K. P. V.
Control of rhinoceros beetle.
Bull. Indian centr. Coconut Cttee, 1951, **4**: 151.

Recent trials at Kayangulam have shown that grubs of *Oryctes rhinoceros* can be destroyed by spraying breeding places with 0·01% BHC.

3062. Lever, R. J. A. W.
A new coconut pest in Singapore.
Malay. agric. J., 1951, **34**: 79-82, bibl. 12.

Reports the recent introduction into Singapore, probably by air in 1949, of the Philippine leaf-miner beetle, *Promecotheca cumingi* Baly, which is a major coconut pest in the Philippines. After several months its spread was apparently being checked by indigenous parasites, of which 5 were noted, the commonest and most efficient being a larval parasite *Pleurotropis parvulus* Ferr., which was the species successfully introduced from Java to Fiji in 1933 to control a closely related *Promecotheca*. A.C.S.

3063. Griebel, C.
Durch Pilzbefall verdorbene Cocosnüsse. **(Coconuts spoilt by fungal infection.)**
Z. Untersuch. Lebensmitt., 1951, **92**: 3: 184-5, from abstr. in *Rev. appl. Mycol.*, 1952, **31**: 114.

The mould isolated from rancid coconuts at the Institute of Foodstuffs, Drugs, and Forensic Chemistry, Berlin, was identified as a species of *Mucor*. Entry to the endosperm had been effected through one of the three germ pores in the endocarp.

Coffee.

(*See also* 2117, 3170f, k, 3171k, l, 3209, 3212, 3238.)

3064. Chevalier, A.
Les caféiers de l'Oubangui-Chari et du Congo français et l'amélioration de leur culture. **(The coffees of Oubangui-Chari and the French Congo and the improvement of their culture.)**
Rev. int. Bot. appl., 1951, **31**: 353-67, bibl. 5.

In addition to a general account of coffee growing in French West Africa and other French colonies and the steps needed to improve methods, brief descriptions are given of 7 species of *Coffea* growing wild or cultivated in West Africa. An account is also given of the tracheomycosis disease attributed to a *Fusarium* sp. which is particularly deadly to *C. excelsa*; the bibliography refers to recent papers on this disease. [See also abstract 3073.]

3065. Narasimhaswamy, R. L.
Planting practices in coffee.
Leafl. Indian Coffee Bd Res. Dep. **4**, undated, pp. 8.

Information is given on soil, altitude, aspect and rainfall requirements, the clearing and lay-out of land, including contour hedge planting, preparation of planting holes, methods of transplanting, shade, cultivation, topping and suckering and spraying against leaf disease.

3066. Elgueta, M., and Bonilla, G.
Efectos de la sombra y de otros factores en el transplante de cafetos del almacigal al criadero. **(The effects of shade and other factors in transplanting coffee from the seed-bed to the nursery.)**
Turrialba, 1951, **3**: 140-3, illus.

A series of 3 experiments was designed to determine the best conditions for transplanting coffee. The results showed that shading greatly improved the take of plants. Artificial shade was better than natural, except in one experiment when it was equalled by shade of *Ricinus communis*. Under favourable shade conditions the age of the plants at transplanting had no significant effect, but under conditions of heavy rain or lack of shade the best results were obtained with plants in which the cotyledons were still covered. Depth of planting was of little importance. Even under good conditions for transplanting, a failure of 10-15% can be expected.

3067. Sundaram, S.
Agronomics of arabica coffee clearing.
Indian Coffee, 1951, **15**: 223-5, 246-8.

In a general discussion on methods of replanting coffee reference is made to 2 experiments. At Chethalli *Crotalaria anagyroides* sown at 3 lb. per acre towards the end of the monsoon in alternate interspaces in single rows across the slope checked erosion, provided 1,500 lb. per acre of green matter from thinning and

pruning in the same year, about 3,000 lb. from stumping at the outset of the next S.W. monsoon and about 2,000 lb. from topping later in the second year. Of legumes tested in smaller plots the best, after *C. anagyroides*, were in descending order: *Sesbania speciosa*, *Crotalaria usaramoensis*, *Tephrosia candida* and *T. vogelii*, and *Sesbania aculeata*. In another trial on primary shading *Crotalaria anagyroides* planted all around young coffee competed excessively with the result that 54% of the coffee plants died compared with 3 to 12% under 5 types of artificial shading.

3068. CHOKKANNA, N. G.
Nitrogen, phosphate and potash status of some coffee soils of South India and manuring of coffee.
Plant. Chron., 1950, **45**: 563-9, bibl. 28.

The literature on the NPK status of coffee soils and the manurial requirements of the crop in different parts of the world is reviewed. Soil analyses from a number of coffee areas in S. India are tabulated and from these it is concluded that the soils of the area are fairly well supplied with N and K_2O but are generally deficient in P_2O_5. Though most of the soils are nearly neutral they tend to lack lime. The poor yields obtained from S. Indian coffee are discussed in the light of these findings and in relation to cultural practices, notably a tendency to use very dense shade.

3069. UNDERWOOD, G. E., AND DEATHERAGE, F. E.
The use of an ion exchange resin for the hydrolysis of casein and coffee proteins.
Science, 1952, **115**: 95-6, bibl. 7.

A method of hydrolyzing proteins by the use of an ion exchange resin (Dowex-50, a sulphonated styrene resin) is described. Chromatographic analyses of coffee protein hydrolysates prepared in this way and by the classical HCl method are compared, and it is concluded that the new technique offers considerable promise for the study of proteins.

3070. DUQUE, J. P.
La podredumbre negra de la raíz del cafeto **(Black root rot of coffee.)**
Rev. Café El Salvador, 1951, No. 230, pp. 31-7, and No. 231, pp. 103-15, from abstr. in *Bol. inf. Colombia*, 1951, **2**: 19: 6-7.

Observations made on black root rot of coffee over a period of 19 years in 8 South American countries are recorded. The disease was found to occur in soils containing decomposing woody material, on which the pathogen lived saprophytically. It would gradually invade living coffee roots when these came in contact with infected material. Coffee, cacao, cassava and many other plants can be attacked. The disease occurs both on level and sloping land but is more common on the former, espêcially when there is an excess of moisture. Control measures recommended include (*a*) collecting and burning all infected material, (*b*) applying lime to raise the pH to about 6, and (*c*) not applying insufficiently decomposed organic matter in the planting holes.

3071. SZKOLNIK, M.
Coffee trunk and stem canker in Guatemala.
Plant Dis. Reptr, 1951, **35**: 500-1, bibl. 5.

A trunk and stem canker disease has been observed in Guatemala; it appears to be the same as that occurring in Colombia and Venezuela [*H.A.*, 21: 3015] and is caused by *Ceratostomella fimbriata*. In Guatemala it occurs most commonly in wet and humid areas. Trunk wounds are believed to play a significant part in favouring natural infections. Better aeration and drying and reduction of mechanical wounds during weeding operations are believed to be measures which will reduce losses. Pruning can be employed to advantage to prevent the spread of isolated infection to other parts of the tree. Severely diseased plants should be uprooted and burned.—Experimental Plantations, Inc., Guatemala and Costa Rica.

3072. CASTAÑO, J. J.
Interpretación de los síntomas y de los signos de la enfermedad de la macana en el café para el establecimiento de la diagnosis. **(Interpretation of the symptoms caused by *Ceratostomella* infection on coffee, for the purpose of diagnosis.)**
Bol. inf. Colombia, 1951, **2**: 19: 27-32, bibl. 3, illus.

The anatomical, morphological and physiological symptoms of *Ceratostomella* infection in coffee are described in detail.

3073. SACCAS, A. M.
La trachéomycose (carbuncullariose) des *Coffea excelsa*, *neo-arnoldiana* et *robusta* en Oubangui-Chari. **(Tracheomycosis of *Coffea excelsa*, *C. neo-arnoldiana* and *C. robusta* in Oubangui-Chari.)**
Agron. trop., 1951, **6**: 453-506, bibl. 11, illus.

A very detailed account is given of studies on this serious disease of coffee in central and west Africa. *Coffea excelsa*, *C. neo-arnoldiana* and *C. dewevrei* are equally susceptible, and more recently it has been found to attack *C. robusta* [see also *H.A.*, 21: 4010]. The symptoms of the disease are described. In general growth stops suddenly, the terminal buds turn black and the younger leaves develop chlorotic bands along the principal veins. All the leaves of the terminal shoots then turn yellow and hang downwards, and soon become brown and then black. A few days later the remaining leaves follow the same course, and finally the tree dies. Studies on the dissemination of the disease show that its spread is haphazard and exclusively aerial. The causal organism is *Fusarium xylarioides* Steyaert, and its morphology and biology are fully described, as are the results of inoculation tests and anatomical studies of infected coffee stems. Investigations on possible control measures indicate that the prevention and protection of wounds is important. Painting the trunks with a mixture containing sodium arsenate has proved effective in preventing damage by borers and termites. Copper sulphate can be used to disinfect wounds and at concentrations not exceeding 1 to 1·5% as protective sprays. All dead or dying bushes should be dug up and burnt together with any debris that has fallen from them. Finally inoculation studies on several lines of *C. robusta* have shown marked differences in susceptibility and suggest that the selection of resistant lines should

ultimately provide the most satisfactory and economical means of controlling the disease.

3074. FIEDLER, H. G.
Studien zur Biologie und Bekämpfung der Kaffeewanzen (*Antestia lineaticollis* Stål und *A. faceta* Germ.) in Ostafrika. **(Studies on the biology and control of *A. lineaticollis* and *A. faceta* on coffee in East Africa.)**
Z. angew. Ent., 1950, **31**: 473-99, bibl. 11, from abstr. in *Rev. appl. Ent.*, 1952, **40**: 50-1.

Coffee in the Kilimanjaro and Meru areas of Tanganyika is attacked by *Antestia lineaticollis*, which is very numerous, and *A. faceta* which is less important. The eggs of *A. lineaticollis* hatched in 5-8 days in the hot dry season (December-March). In the cool rainy season (March-June) the egg stage lasted up to 12 days. That of *A. faceta* lasted 5-6 days in the hot season. The nymphs and adults sucked the juices from the flower buds and from all but the youngest of the berries, older nymphs and adults piercing the endocarp in unripe berries and infecting them with *Nematospora*. The adults of both species were most active on warm, dry days, but did not fly readily if undisturbed. The only parasite of economic importance was the stylopid, *Corioxenos antestiae*, which kept the *Antestia* population at a low level during May-October, but was by itself unable to prevent annual outbreaks. Bait-sprays of sodium arsenite and sugar, which are commonly used against *Antestia*, do not harm the parasite. They should be applied twice, when neither ripe berries nor flower buds are present, at an interval of 14 days.

3075. FIELDER, H. G.
Biologie und Bekämpfung der Kaffee-miniermotten Ostafrikas unter Berücksichtigung des Klimas. **(Biology and control of the coffee leaf-miners of East Africa with reference to climate.)**
Z. angew. Ent., 1949, **31**: 1: 38-76, bibl. 10, illus., from abstr. in *Rev. appl. Ent.*, 1952, **40**: 12.

Descriptions are given of all stages of *Leucoptera caffeina* Wshbn. and *L. coffeella* (Guér.), which are among the most important leaf-feeding pests of coffee in Tanganyika, together with an account of field observations on their bionomics carried out mainly in the Kilimanjaro area. The life histories of the two species were similar, but *L. caffeina* sought high humidity and shade, and the females laid their eggs on mature leaves in chains of 2-12, usually 5-8, whereas *L. coffeella* preferred a sunny situation and laid its eggs singly. Larvae of both species entered directly into the leaves from the eggs and fed on the palisade layer. Those of *L. caffeina* normally remained in groups during most of their feeding period and consumed on the average over three times as much as larvae of *L. coffeella*. Larvae of both species left their mines when fully fed and sought leaves in the shade on which to spin their cocoons. The commonest parasite of *L. caffeina* was *Pleurotropis coffeicola* Ferrière, which was present throughout the year. Parasitized larvae continued to feed but died without pupating. Parasitism was particularly high during hot, dry weather, and was then sufficient to suppress local outbreaks rapidly. Nicotine sulphate added to the fungicidal spray of bordeaux mixture is sometimes effective. It is suggested that sprays should be confined to small areas to check incipient outbreaks and should be applied when the eggs or adults are present or the larvae are seeking their pupation sites.

3076. TOSELLO, A.
A determinação da área do terreiro necessária para a secagem do café. **(Calculation of the area required for drying coffee.)**
Bol. Super. Serv. Café, S. Paulo, 1951, **26**: 1020-4, bibl. 4.

The problem of calculating the area required for drying the coffee crop from a given number of trees is discussed, a formula being presented and explained.

Mangoes.

(*See also* 3170t.)

3077. ROY, R. S.
Plant breeding and alternate bearing of mango (*Mangifera indica* L.).
Sci. and Cult., 1951, **17**: 122-4, bibl. 5.

A plea is made for a programme of breeding and selection aimed at raising mango hybrids with a regular bearing habit.

3078. VENKATARATNAM, L.
Mangoes of Hyderabad.
Indian J. Hort., 1951, **8**: 4: 18-20.

A preliminary survey has shown that Hyderabad State contains over 200 varieties of mango. Some of these, such as Alampur Baneshan, Azumusamar, Asharafsamar and Samarebahist, are outstanding. The main varieties have derived their names from the Moghuls, which suggests that they have been grown from early times. A number of varieties is listed in groups according to the origin of their names.

3079. SINGH, S. N., AND TEOTIA, S. S.
Effect of some hormones on the rootage of mango.
Sci. and Cult., 1951, **17**: 207-10, bibl. 4, illus.

In experiments at Kanpur during the rainy season 1, 2 and 3% of β-indole acetic acid, α-naphthalene acetic acid, phenyl acetic acid and β-indole butyric acid were applied to marcot cuts on 2 varieties of mango. With the variety Dasehri 1% NAA induced 100% rooting while with Langra 2% IAA gave a higher percentage (70%) than the other hormones. Lower percentages and much slower rooting occurred when treatments were applied in the spring. Three weeks before the marcots were severed some were wrapped with a second layer of leaf mould while others were pressed into pots filled with leaf mould. Both these treatments, and particularly the last, markedly stimulated root development as compared with control marcots left with their original single covering of sand and sacking. The pot-layered marcots showed 100% survival in the nursery and the double-covered marcots 40% compared with 0% for the controls. Attempts to root semi-hardwood cuttings were unsuccessful.

3080. VERMA, G. S., AND KAMAL, M.
Rot of *Mangifera indica* Linn. caused by *Aspergillus*.
Curr. Sci., 1951, **20**: 68-9, bibl. 2.

A rot of mango fruits which usually affects about 25% of the crop of certain varieties in the Lucknow region is described. Isolation and inoculation studies suggest that the causal organism is *Aspergillus niger*.

3081. Brun, J.
Anthracnose du manguier en Guinée, *Glomerella cingulata* (St.) Sp. et Von Schr. (Anthracnose of mangoes in French Guinea.)
Fruits d'Outre Mer, 1951, **6**: 475-6, bibl. 3, illus.

Symptoms of the disease are described and illustrated. Control on scattered mature trees is impracticable, but satisfactory control has been obtained in nurseries in Guinea with 5–7·5 : 5 : 100 bordeaux mixture.

3082. Banerji, S., and Chatterji, N. C.
***Altica (Haltica) coerulea* Oliver, as flower feeding beetle of mango.**
Sci. and Cult., 1951, **17**: 179-80, bibl. 2, illus.

This flea beetle is reported for the first time as a serious pest of mangoes. In both 1950 and 1951 it caused extensive destruction of the flowers in parts of West Bengal.

3083. Usman, S.
Hopper pest of mango blossoms.
Mysore agric. J., 1951, **26**: 64-5.

A description is given of the damage caused by the three common species of mango hopper (*Idiocerus niveosparsus*, *I. atkinsoni*, and *I. clypealis*) and of the insects and their life histories. Control by spraying the blossoms with fish oil rosin soap or hongey oil soap (1 lb. to 8 gal. of water in each case) is fairly effective if carried out when the spikes appear and subsequently every 15-20 days. Encouraging results of tests with DDT are described.

3084. Johar, D. S., and Anand, J. C.
Note on the microbiology of brined mango slices.
Indian J. Hort., 1951, **8**: 4: 45-8, bibl. 4.

Green mangoes required for out-of-season use in the manufacture of chutney are usually stored as slices with powdered salt in barrels. Tests with 3 brine solutions have shown that salt can be saved, de-salting made easier, and a better product turned out by storing them in a 15% brine solution.

Oil palms.

3085. Cramer, P. J. S.
A comparison between oil palms and coconuts.
Landbouwk. Tijdschr., 1950, **62**: 427-48, bibl. 30 [received 1952].

The value of the oil palm as an oil-producing plant is compared with that of the coconut, reference being made to the quality of the oils, production and export figures, the possibility of extension, the danger of disease affecting the future of the industries, yields per acre, and the possibility of increasing yields by improving planting material. It is concluded that the oil palm is the best crop for the production of edible oil to supply the world market, as the oil can be produced at the lowest cost per unit of any crop. It does require, however, a heavy capital outlay on equipment. Coconuts have a special place in native agriculture.

3086. [Malaya.]
Notes on current investigations, April to June, 1951. Oil palm.
Malay. agric. J., 1951, **34**: 135-6.

There is evidence from analysis of 5 years' records that there is, in most families, a correlation between yield and girth and also between yield and height. In the case of greater girth, palms tend to produce larger but not more numerous bunches. In the case of greater height, the explanation is probably to be found partly in the fact that the tall palms shade the smaller ones. Care has to be exercised in selection to distinguish an environmental as well as a genetic factor in the yield of tall palms. Tests with oil palm seedlings in nutrient solutions and in aluminium sulphate solution indicated that when oil palms suffer from wilt and die-back in acid soils the effect is not due to acidity or to soluble aluminium.

3087. Chambon, R., and Van Dromme, F.
Création de palmeraies artificielles en territoire de Kongolo. **(Creation of oil palm plantations in Kongolo district.)**
Bull. agric. Congo belge, 1951, **42**: 426-8.

The germination and nursery techniques used are briefly described. Field crops are raised for a year on newly cleared areas before planting the young palms. Cover crops of *Pueraria* and *Calopogonium* are subsequently maintained.

Papaws.

3088. Agnew, G. W. J.
The papaw.
Qd agric. J., 1951, **73**: 197-211, illus.

In southern Queensland winter temperatures are often sufficiently low to affect adversely the development of the plant or the maturation of the fruit, and occasionally severe frosts cause widespread damage. In north Queensland winds occasionally destroy crops. In spite of these hazards many excellent plantations are to be found along almost the whole Queensland coast. The cultivation of the papaw in Queensland is described under: flower types; tree types, particularly in relation to the types of flower they produce; inheritance of sex, with progeny ratios of various crossings; seed beds; transplanting; field positions; soil and fertilizer requirements; plantation management (thinning, flower production and fruit set, branching, cutting back); harvesting; varieties; fruit characters; hand pollination.

3089. Everett, P.
The mountain papaw: a giant herbaceous plant.
N.Z. J. Agric., 1952, **84**: 12, illus.

The mountain pawpaw (*Carica candamarcensis*) is more frost resistant than the true pawpaw (*C. papaya*) and will withstand without serious injury a temperature of about 28° F. after the plants have become well established. In recent years many plants have been cultivated in various parts of Auckland Province, New Zealand. The crop varies greatly on different plants according to soil type, situation, etc., but is generally not more than 1 to 2 bushels per mature plant each year. The plant grows to a height of 15 to 20 ft. Fruits are present throughout the year, but ripen mainly from October to January inclusive. They are

3 to 4 in. long, have a sweetish, slightly acid, perfumed taste and can be eaten fresh, stewed, or made into jam. Given good drainage, plants thrive on a wide range of soils, but they crop best on fertile soils. They are raised from seed, sown in late spring, either under glass or outdoors, and are suitable for planting out when 9 in. or more high. This can be done at any time when there is ample soil moisture except during winter and early spring. Plants should be spaced about 10×10 ft. For marketing the fruit should be harvested as soon as the green starts to disappear, but for home use they should remain on the plant until completely yellow and should then be stored for a few days to complete ripening. Plants raised from seed may be any one of three types, male, female, or monoecious. The fruit on female plants, generally produced either singly or in pairs, is appreciably larger than that produced on monoecious plants. There is no known means of distinguishing the different kinds of plants until flowers are produced. The only disease or pest so far found on the mountain pawpaw in New Zealand is a common species of thrips which is easily controlled by spraying with nicotine sulphate plus 1% summer oil.

3090. Bird, J., and Adsuar, J.
On the viral nature of papaya bunchy top.
From abstr. in *Phytopathology*, 1952, **42**: 3.

Evidence that the causal agent is capable of reproducing within the host plant was shown by transmission of the causal agent in series through one plant after another by grafting. A single leafhopper, *Empoasca papayae*, was capable of transmitting the virus.

Pineapples.

3091. Gray, R. A.
Composition of honeydew excreted by pineapple mealybugs.
Science, 1952, **115**: 129-33, bibl. 14, illus., being *Tech. Pap. Pineapple Res. Inst. Hawaii* **202.**

A pineapple leaf was made radioactive by allowing it to photosynthesize for 24 hr. in an atmosphere containing $C^{14}O_2$, and mealybugs, *Pseudococcus brevipes*, were allowed to feed on the leaf for 48 hr. Filter paper chromatograms were prepared from which the amino acids, sugars and organic acids in honeydew excreted by the insects were determined. The results do not support the view that sucking insects, which excrete copious quantities of excess carbohydrates in their honeydew, must take in large amounts of plant juice to obtain sufficient amino acids and proteins. Relatively large amounts of as many as 19 amino acids and amides were found in the honeydew, the number found increasing with the period of feeding. At least 5 of these amino acids were not found in the pineapple leaf. Of the other components 5 carbohydrates were identified as well as malic and citric acid and salts of citric acid.

Rubber trees.

(*See also* 3178, 3180, 3223.)

3092. Fuller, H. J.
War-time rubber exploitation in tropical America.
Econ. Bot., 1951, **5**: 311-37, illus.

The reactivation of the tropical American rubber industry during the period 1942-4 is recorded. Latex was obtained, not only from *Hevea brasiliensis* and *H. benthamiana*, but also from *Castilloa elastica*, *C. ulei*, *Manihot glaziovii*, *Parthenium argentatum*, *Hancornia speciosa*, *Sapium jenmani*, *S. aucuparium*, *S. hippomane*, *Micrandra siphonioides*, *Cryptostegia grandiflora* and *C. madagascariensis*. Various tapping methods used are described.

3093. Cherian, P. P.
Some technical aspects of current rubber problems—selection of improved planting materials.
Plant. Chron., 1951, **46**: 550-3.

Data collected from estates in S. India on the performance of introduced clones and clonal seedlings are presented. Although insufficient data are available on which to base final recommendations the survey indicates that in S. Travancore below about 700 ft. buddings of the older proved clones, particularly Tj.1, are yielding satisfactorily. Elsewhere in Travancore-Cochin yields are very much lower.

3094. Heath, R. G.
The supply of planting material to rubber smallholders.
Malay. agric. J., 1951, **34**: 76-8.

Smallholdings (less than 100 acres) total 1·4 million acres, i.e. 42% of the Malay rubber acreage; over 90% of the smallholding trees are over 25 years old and thus are, or soon will be, uneconomic. This article is essentially a first progress report on the scheme to induce and assist smallholders to renew their plantings with improved stock; the scheme has an initial target of 250,000 acres in 5 years. Particulars are given of the various aspects of the scheme, viz. budwood multiplication nurseries, clonal seedling nurseries, establishment of a clonal seed garden by hedge-plantings of the best parent clones to provide future supplies of planting material, and training young local personnel. In just over a year from the inception of the scheme, material representing some 7,000 acres of replanting has been distributed. So far a marked preference has been shown for clonal seedling stumps as opposed to budwood, the former involving less skill and trouble. A.C.S.

3095. Gregory, L. E.
Una nota sobre el enraizamiento de clones de Hevea. **(A note on the rooting of hevea clones.)**
Turrialba, 1951, **1**: 201-3, illus.

It has hitherto been found very difficult to root cuttings of adult hevea trees, whereas juvenile plants, during the first few months after sowing, would root easily. This was confirmed in a trial at the Hevea Cooperative Experimental Station, Turrialba, where cuttings were taken from plants from 1 to 24 months old. Rooting was markedly reduced in cuttings older than 6 months, while cuttings from 2-year-old plants did not root at all. In explanation of this it is suggested that leaves of juvenile hevea plants produce a root-inducing substance and that leaves of mature plants do not. In order to test this theory, buds of 4-month-old seedlings were budded onto the clone GV-31. When leaves had developed from these buds cuttings were taken from

the budded stems, the cuts being treated with indolebutyric acid. Fifteen of the 20 budded cuttings rooted after 50 days, whereas only 1 of the unbudded controls rooted. The value of being able to establish clones on their own roots is pointed out. It is suggested that this method might be applied to other plants that are difficult to root.

3096. YOUNG, H. E.
Root disease in replanted areas.
Adv. Circ. Rubb. Res. Inst. Ceylon **31**,* 1951, pp. 4.

Three fungi attacking the roots of living rubber trees are, in order of importance, *Fomes lignosus*, *F. noxius* and *Poria hypobrunnea*. *F. lignosus* may survive for as long as 4 years on old rubber stumps. Old trees may have root disease while still appearing healthy, and these are the usual source of infection of replants. Poisoning old trees or their stumps encourages the fungi to spread. A much better method is to uproot old rubber with an implement such as a " monkey grubber " which at present costs will remove a tree and its main roots for 42 cents. Symptoms of the 3 fungi on the roots are described. Control measures to be adopted where a diseased plant is found are based on discovering the source of infection, isolating the infected area within a trench and burning on the site any diseased material. The treated area should be planted thickly with *Crotalaria anagyroides* to indicate whether any diseased pieces of wood have been overlooked. Where the disease is prevalent periodic unearthing and inspection of the root systems of young replants is also recommended.

3097. YOUNG, H. E.
Crown budding for oidium resistance.
Adv. Circ. Rubb. Res. Inst. Ceylon **32**, 1951, pp. 3, bibl. 1, illus.

Trials of rootstocks budded with high yielding clones and these again budded with the clone LCB. 870, which is resistant to *Oidium heveae*, were started in Java some years before the war. Tapping records lost during the Japanese occupation have recently been discovered and a summary of the conclusions sent to the author by J. S. Vollema, who is to publish full details in *De Bergcultures*. The results show that the LCB. 870 crowns gave latex yields of only 63% of comparable unbudded seedlings and depressed the yield of seedling stocks near the point of union to 75% of that of comparable unbudded seedlings. The yield depressing effect on the stock extended to at least 100 cm. below the union but had disappeared at 150 cm. To be safe the top budding should therefore be done at 250 cm. to provide an unaffected tapping panel of at least 100 cm. from ground level. The suggested procedure for top working in areas affected by oidium is described.

3098. MILANEZ, F. R.
Segunda nota sobre os laticíferos. **(Second note on the laticiferous plants.)** [English abstract ⅓ p.]
Lilloa, 1948, **16**: 193-211, bibl. 18, illus. [received 1952].

Detailed observations are reported on the following: (1) the extrusion of a nuclear substance from the latex tubes of the secondary tissues and the sieve tubes of *Hevea brasiliensis* and *Manihot glaziovii*; (2) the part played by the plastidomes of the laticiferous cells of *H. brasiliensis* in the formation of rubber corpuscles; (3) the protoplasmic nature of latex in the above-mentioned species and in *Apinagia accorsii*.

* Superseding *Circ.* **10.**

3099. BLOOMFIELD, G. F.
Studies in hevea rubber. Part I. Molecular state of the rubber hydrocarbon in freshly-tapped latex.
Part II. The gel-content of rubber in freshly-tapped latex.

BLOOMFIELD, G. F., AND DRAKE, G. W.
Part III. Fractionation of fresh rubber and the interpretation of viscometric and osmotic data.

BLOOMFIELD, G. F.
Part IV. Factors affecting the plasticity of raw rubber, and some new data on hardening of rubber by benzidine.
Part V. Oxygenated and low molecular fractions in fresh rubber.
Part VI. Characteristics of rubber in latex of untapped trees and in branches of trees in regular tapping.
J. Rubb. Res. Inst. Malaya, 1951, **13**: *Commun.* **271**, pp. 1-17, bibl. 17, pp. 18-24, bibl. 10, illus.; *Commun.* **272**, pp. 1-13, bibl. 25, pp. 14-25, bibl. 5; *Commun.* **273**, pp. 1-9, bibl. 9, pp. 10-23, bibl. 9.

Parts I-V are concerned with the chemistry of rubber. Part VI states that the discovery that latex in some untapped trees and in the branches of some trees in regular tapping contains a high proportion of microgel enables important conclusions to be drawn as to the area of bark affected by tapping, since, when an untapped tree is brought into production, the microgel latex contained in a considerable area of the tree is replaced by normal latex. Microgel latex gives solutions of low intrinsic viscosity and very small osmotic pressure. It yields very hard rubbers. Some clones, notably P.B. 186, do not contain much microgel latex.

Sugar cane.

(*See also* 2049, 2492-2497, 3170a, j, v, z, 3171c, j, m, q, 3191, 3214, 3222, 3235, 3252a.)

3100. SAINT, SIR J., AND OTHERS, AND STEVENSON, G. C.
Research work, sugar-cane agriculture 1950.
[*Bull.*] *B.W.I. Sugar Ass.* **8**, [1951?], pp. 17.

Unlike its predecessors in the series this bulletin does not contain the normal summary of the results of research on sugar cane carried out during the year. Instead it consists of 2 papers, the first by a committee under the chairmanship of Sir John Saint consisting of notes on soil types and concise summaries of investigational work in progress during 1949-50 in Antigua, Barbados, British Guiana, Jamaica, St Kitts-Nevis, Trinidad and St Lucia, and the second by G. C. Stevenson on sugar cane breeding and variety testing in the same colonies. [For a fuller account of this work see abstract 3191.]

3101. KNOWLES, W. H. C., AND CAMERON, C.
Field experiments with sugar cane, XIX.
Sugar Bull. Brit. Guiana Dep. Agric. **19**, 1951, pp. 1-36.

The appearance of " leaf scald ", caused by *Xanthomonas albilineans*, hitherto confined in the western hemisphere to Brazil, is reported, and methods of control are to be investigated. The results of 63 variety trials are recorded and form the basis of recommendations including the discarding of D.49/41, D.142/41, and D.158/41 and the extended use of B.41227 and B.37161. Small commercial plantings of B.4098 and B.40105 are also suggested. The 8 manurial trials summarized all involved the use of phosphates. Ammonium phosphate gave inconclusive results on pegassy clay. The standard estate ratoon dressing of 4 cwt. per acre sulphate of ammonia gave significantly lower yields than 10 cwt. per acre applications. No beneficial residual effects could be traced in subsequent ratoon crops to the application of either phosphates or the proprietary compound Limax.

3102. MUKHERJEE, S.
Survey and collection of wild sugarcane relatives from India.
Indian Fmg, 1950, **11**: 404-7, plus 8 plates.

Reference to the collection of 215 types at Coimbatore has been made earlier [see *H.A.*, 21: 3055]. The present account emphasizes the variation in characters found to exist among varieties of *S. spontaneum*, some of which possess 8 to 9·9% sucrose, and suggests that when the collection is complete a valuable range of parental characters will be available for breeding new canes for various purposes.

3103. SAINT, SIR J.
Sugar cane breeding in Barbados.
Brit. agric. Bull., 1952, **4**: 319-23, illus.

An account is given of the history of cane breeding in Barbados, both before and after the establishment of the B.W.I. Central Sugar Cane Breeding Station in 1932, present methods of controlled pollination and of testing and selecting seedlings and future developments designed to provide for a greater degree of precision.

3104. LUKE, W. J., JR.
Results of varietal trials at Central Romana in the Dominican Republic.
Proc. 1950 Mtg B.W.I. Sugar Tech., Jamaica, pp. 73-83.

Results are tabulated for 10 experiments involving 23 harvests. B.37161 has generally been outstanding and its cultivation should be extended in all medium to good soils. B.34104 shows promise for shallow, rocky soils. P.O.J.2878 is already widely grown and has proved adaptable and a good ratooner. M.336 with its exceptionally high sugar content might be retained in areas where other varieties have given poor juices, and M.42 might also be retained. The remaining varieties, which include several M. and PR. canes and Co.421, should be discarded.

3105. MANGELSDORF, A. J.
Sugar cane breeding in Hawaii.
Proc. 1950 Mtg B.W.I. Sugar Tech., Jamaica, pp. 150-8.

An account is given of the history of sugar cane breeding in Hawaii, the breeding collection, crossing technique, seedling propagation technique and testing procedure.

3106. GOUAUX, C. B.
Test field averages of important sugar cane varieties.
Sugar J., 1951, **14**: 7: 26-9.

Averages over 5 years of Brix, normal juice sucrose, purity, tons cane per acre, lb. sugar per ton and per acre are tabulated for the leading Louisiana varieties and Co.290 grown in 9 test fields. In 5 of the tests the best variety was C.P.36–105 and in 2 C.P.36–13. Two year averages are also tabulated for the recently released varieties, C.P. Nos. 44–101, 44–155 and 43–47, grown in the same test areas with the variety that led in the 5 year tests as standard. In 8 out of 9 cases one or other of the new varieties surpassed the standard.

3107. RAO, B. V.
Varietal composition of sugarcane in Mysore State.
Mysore agric. J., 1951, **27**: 37-41, illus.

During the period 1939-1949 the area under cultivation was fairly constant at 40-50 thousand acres per annum. The area under improved varieties rose from 50% in 1942 to 70% in 1948-49. The 4 classes of variety under cultivation (local, exotic, improved Coimbatore and improved Mysore) are briefly discussed.

3108. BRILLANTE, A. J.
Sugarcane variety experiments in Bogo-Medellin [Philippines].
Sugar News, 1952, **28**: 11.

Over a plant and first ratoon crop H.37–1933 produced more sugar per ha. than 5 other varieties including the standard P.O.J.2878, although H.32–8560 gave a higher ratoon yield of sugar, and PSA 34 and PSA 32 gave considerably higher tonnages of cane. In another plant trial harvested at 12½ months P.O.J.3016 out-yielded P.O.J.2878 in both cane and sugar and showed a much higher sucrose content.

3109. STEVENSON, G. C.
Report on a visit to St. Lucia and Grenada, July, 1951.
Bull. B.W.I. centr. Sugar Cane Breed. Stat. **36**, 1951, pp. 8.

Conditions for growing sugar cane and the present position with regard to varieties in these two Windward Islands are outlined. In St. Lucia it is recommended that in future the main plantings should consist of B.37172 and B.4362 but that the present leading variety B.37161, accounting for 34·5% of the total acreage, should also be retained particularly for late reaping. In Grenada where B.37176 occupies about 63% of the total cane acreage it is thought that B.41227 and B.4098 would give better results in relatively moist and dry conditions respectively; B.4362 should also prove valuable.

3110. ARTSCHWAGER, E.
Structure and taxonomic value of the dewlap in sugarcane.
Tech. Bull. U.S. Dep. Agric. **1038**, 1951, pp. 12, bibl. 7, illus.

The dewlap, or joint triangle, patterns of sugar cane approach the specifications required for taxonomic use. A great variety of patterns that are clone-limited,

are all variants of 3 fundamental types: squarish, deltoid, and ligulate. Common dewlap patterns found in various clones are illustrated. The pubescence of the dewlap, which varies qualitatively and in degree, has long been used in sugar cane taxonomy. Certain of Jesweit's hair groups, based on pubescence on the outer surface, the inner surface or the midrib, are re-examined and modified and two new groups added.

3111. RAGHAVAN, T. S.
Multiple buds in sugarcane.
Curr. Sci., 1951, **20**: 330.

The occurrence of multiple buds at a node has been observed in 3 cane varieties none of whose parents showed this character. Setts with 1, 2, 3 and 4 buds were planted but in each case only one bud formed a shoot and only single buds developed on the shoots at each node. It is presumed that physiological causes were responsible for the appearance of the multiple buds.

3112. HES, J. W.
The influence of centrifugation on the germination of sugarcane cuttings.
Sugar J., 1952, **14**: 8: 11, bibl. 6, illus.

Subjecting 2-eye cane setts of POJ 2878 for 30 min. to a centrifugal force directed towards the basal end hastened sprouting of the apical eye and retarded that of the basal eye by comparison with untreated setts. When the centrifugal force was directed towards the apical end there was little difference in the rate of sprouting of the two eyes. Applying heteroauxin on cotton plugs to the ends of setts while these were subjected to centrifugal force towards the basal end had an inhibiting effect on the germination of the apical eye.—Java Sugar Exp. Stat., Pasuruan.

3113. BACS, G.
Plants versus ratoons.
INNES, R. F.
Note on plants versus ratoons.
Proc. 1950 Mtg B.W.I. Sugar Tech., Jamaica, pp. 143-8.

Yield records over 5 years on an irrigated estate in Jamaica show the production of sugar by ratoon canes to have averaged about 0·3 tons per acre per month over a 12-month cropping cycle. Ratoons represented 75% of the total cane area and it is suggested that, theoretically, if they had all been allowed one more month's growth, the increased yield of sugar would have offset the higher yield obtained from the 25% of the area in plants harvested at 15 months. Mr. Innes cites figures which confirm that on irrigated ratoons the yield of sugar per acre was directly proportional to the length of the growing period when this varied between 11 and 14·75 months, but points out that the lengthening of ratoon growing periods would be difficult under natural rainfall conditions and is in any case incompatible with long ratooning cycles.

3114. MALLIK, A. K.
A preliminary study in drought resistance of sugarcane.
Indian Ecol., 1946, Vol. 1, No. 1, reprinted in *Indian J. agric. Sci.*, 1950 (issued 1951), **20**: 143-6, bibl. 1.

Pot plants of the reputedly drought-resistant Co. 421 (*Saccharum officinarum*) and a variety of *S. spontaneum* were subjected to drought with low atmospheric humidity and to more humid conditions. Under dry conditions both varieties, but especially the spontaneum, showed higher transpiration rates than under humid conditions, but, whereas with the spontaneum the relative transpiration (the ratio transpiration/evaporation) was similar under both conditions, with Co. 421 it was very much smaller under dry than under humid conditions.

3115. PENNE, F., JR.
Overhead irrigation in Puerto Rico.
Sugar J., 1951, **14**: 3: 26-7, 74, 79, illus.

Five overhead irrigation installations, 1 permanent and 4 portable, on Puerto Rican cane farms are described briefly. The advantages of overhead as compared with furrow irrigation and points to be considered in designing an overhead system are summarized.

3116. PEARSON, C. H. O.
The maintenance of organic matter in the soils of the Natal coast belt.
S. Afr. Sugar J., 1952, **36**: 17-23.

The results of several experiments in Natal are reviewed in which burning adversely affected ratoon yields as compared with leaving the trash on the ground. Fertilizers, except in one case of marked P deficiency, produced a greater response in trashed than in burnt plots. Lining the trash between rows gave better results than leaving a trash blanket. When a crop is ploughed out and the field rested before replanting it would appear to be essential to keep the land covered with a green manure crop if the organic matter residues from trash are not to be lost.

3117. MARTÍNEZ, M. B., AND LUGO LÓPEZ, M. A.
Plans for research on the effect of subsoiling and subsoil fertilization on sugar cane fields.
Sugar J., 1951, **14**: 3: 36, 39, 42-3, bibl. 7.

Experiments on subsoiling and subsoil fertilization that are being laid down in Puerto Rico on soils with heavy clay pans beneath the surface are described, and the literature on the subject reviewed briefly.

3118. IVE, H. S.
Some results obtained by organic manuring of sugar cane.
Proc. 1950 Mtg B.W.I. Sugar Tech., Jamaica, pp. 30-9, bibl. 10.

Yield records over several years from 2 observation plots and 20 fields on relatively poor, thin or eroded soils at Frome, Jamaica, that had received either inorganic fertilizers alone or basic dressings of organic manure from fly penning, pen manure or filter mud and ashes showed that organic manures produced increased yields and increased ratooning power in all cases. Possible reasons for these results are discussed, and in particular it is pointed out that in some of the fields an impermeable sub-soil led to very shallow rooting and severe drought injury in cases where organic matter was not added.

3119. PORQUEZ, P. P.
Mungo as source of nitrogen and organic matter for the cane fields.
J. Soil Sci. Soc. Philipp., 1951, **3**: 207-8, from abstr. in *Soils and Ferts*, 1952, **15**: 786.

Ploughing in a crop of mungo (*Phaseolus aureus*) after seven weeks' growth supplies Philippine soils with the N equivalent of 250 kg./ha. of $(NH_4)_2SO_4$. Little or no N fertilizer is needed for sugar cane after ploughing in two such crops. Where intensive sugar cropping is inevitable, interplanting with mungo is advocated. Mineralization of the incorporated mungo is complete in about three months. Previous liming is beneficial and inoculation of the seed is advisable.

3120. Knowles, W. H. C.
The variety and fertilizer position of the Sugar Industry, XVI.
Sugar Bull. Brit. Guiana Dep. Agric. **19**, 1951, pp. 39-48.

The varietal tables which form the bulk of this report contain data abstracted from returns supplied by sugar estates in British Guiana and indicate that the situation was dominated by B.34104, occupying 67·4% of total acreage. It is recorded that over 90% of the value and 68% of the weight of fertilizers used in 1950 was ammonium sulphate compared with 81·7% and 53·2% respectively in 1949.

3121. Luke, W. J., Jr.
Fertilizer studies at Central Romana and Santa Fe in the Dominican Republic.
Proc. 1950 Mtg B.W.I. Sugar Tech., Jamaica, pp. 40-50, bibl. 10.

Three years preliminary NPK trials in the Dominican Republic have shown that cane on most of these soils will respond to N or P or both, provided the sources of N and P are suitable, but not to K. It would appear that rendzina soils will respond to 30 to 60 lb. of both N and P depending on their depth, lateritic soils to 30 to 60 lb. P only and old alluvial soils to 30 lb. N only. No significant responses occurred on 3 other soils but this may have been due to faulty treatments.

3122. Locsin, C. L.
Liming experiments on sugar cane in Victorias, Negros Occidental.
J. Soil Sci. Soc. Philipp., 1951, **3**: 207-8, from abstr. in *Soils and Ferts*, 1952, **15**: 785.

In general, liming was necessary and profitable if carried out after plant-nutrient deficiencies had been assessed and corrected. Soils of this district appear to be increasing in acidity, reaching pH values as low as 4·8—4·3, and many are deficient in available Ca.

3123. Rose, R. D.
The application of scientific methods to some of the problems of cane cultivation.
Proc. 1950 Mtg B.W.I. Sugar Tech., Jamaica, pp. 132-42, bibl. 17.

The use at Caymanas Estates, Jamaica, of growth measurements and sheath moisture determinations as a guide to the application of irrigation water resulted in a marked saving of water and in the cost of irrigation without adversely affecting the yield. Observations suggest that Clements' figure of 73% sheath moisture as the optimum for maturity may require modification with different varieties; with B.3439 on alkaline land, for example, ratooning power was adversely affected by drying below 76%. The sheath moisture index proved more reliable than the analysis of juice from a single stool in deciding reaping priorities. Studies on the nitrogen manuring of cane showed that leaf analyses made 6 weeks after application furnished a reliable guide to the N status. Field control of N manuring is now based on a basic dressing of about 2 cwt. sulphate of ammonia with dressings of 2, 4 and 6 cwt. on representative plots in each field; 6 weeks after application 60 third fully opened leaves from each plot are analysed and recommendations for supplementary dressings of N based on the results.

3124. Robinson, J. B. D.
Notes on the phosphate content of cane juice and related problems in Barbados.
Proc. 1950 Mtg B.W.I. Sugar Tech., Jamaica, pp. 51-7, bibl. 5.

Very low rainfall in Barbados from June to December 1947 resulted in a poor 1948 crop season attended by abnormal difficulties in juice clarification. Analyses of samples from estates having particular trouble with clarification did not, however, show consistently low cane juice phosphate. In 1949 and 1950, when no further general trouble occurred with clarification, juice samples were analysed from manurial trials. The results show that on a red coral soil and a light sandy loam heavy applications of N (in the presence of K) depressed the cane juice phosphate content whether or not heavy applications of P had also been made. The effect of P without N on juice phosphate was variable and inconclusive, In a preliminary placement trial on a black coral soil, however, P placed by the cane stool on the windward side produced an increase in mean juice phosphate compared with the control. A comparison of 5 varieties showed no significant varietal differences in juice phosphate.

3125. Baldovinos de la Peña, G.
Naturaleza de la clorosis en la caña de azúcar cultivada en la zona de Tlaltizapan, Morelos (Primera parte). **(The nature of a chlorosis of sugar cane in the Tlaltizapan district, Morelos [Mexico]. Part I.)**
Chapingo, Mexico, 1950, **4**: 512-21, 527, from abstr. in *Turrialba*, 1951, **1**: 254.

An experiment was carried out to determine whether any of 6 minor elements was responsible for the leaf chlorosis which commonly occurs on sugar cane in the Tlaltizapan district of Mexico. It was found that ferrous iron, at a concentration of 0·05%, caused almost complete recovery of the plants within 15 days of application.

3126. (Beauchamp, C. E.)
Effects of synthetic hormones on the sucrose content of sugar cane.
Sugar, N. York, 1951, **46**: 11: 42-3.

In two trials in Brazil applications of 2,4-D in powdered form at a rate of 50 lb. per acre of 0·25% acid or in liquid form at 60 gal. per acre as an ammonia concentration of 50 p.p.m. showed increases in Brix, sucrose, purity and yield in tests made from 2 to 19 days after treatment. The increases were greatest on the 9th day, and were larger for the liquid than for the powdered hormone.

3127. Thompson, H. A., and Robinson, I. S.
Some aspects of sugar cane maturity testing and ripening control at Monymusk.
Proc. 1950 Mtg B.W.I. Sugar Tech., Jamaica, pp. 84-98, bibl. 4.

The various methods and factors involved in maturity

testing and ripening control including the sheath moisture concept of Clements were investigated on 36 irrigated fields of B.34104 at Monymusk, Jamaica. Random samples of 16 complete canes from 10 to 15 acres proved adequate. To determine the top/bottom ratio, using the hand refractometer, the most satisfactory sampling positions were found to be the middle internodes of the top and bottom third portions of the cane. The use of the hand refractometer to determine top/bottom ratio was subject to several disadvantages; it was slow, and in practice relatively large fluctuations in top/bottom ratio over short periods of time made precise estimates of maturity difficult for a limited number of canes. The sample mill gave results of equal accuracy, and, having the advantages of speed and ease of collection of samples, was adopted for testing the bulk of the 1949-50 crop. A highly significant correlation was found between the top/bottom ratio and tons cane/tons sugar (TC/TS), but its practical value was reduced by the wide fluctuations in the top/bottom ratio compared with the small range of the corresponding TC/TS figures. The percentage sheath moisture was found to be significantly correlated with TC/TS, % total sugars in juice, and % N in the leaf, and attention is drawn to the possible implication of the last of these in fertilizer control. Significant correlations were also found between TC/TS and total sugars in juice, between % N in the leaf and % P_2O_5 in the sheath and between TC/TS and % N in the leaf. Estimations of TC/TS based on sheath moisture were found to be in close agreement with the results of crusher juice analyses. No significant relations were found between % sheath moisture and % total sugars in sheath, % reducing sugars in sheath, % sucrose in sheath, % P_2O_5 in sheath, % reducing sugars in juice, top/bottom ratio, or % reducing sugars % Pol ratio. Similarly there were no significant relations between TC/TS and any of the above except the top/bottom ratio. There were also no significant relations between % reducing sugars % Pol ratio and the top/bottom ratio, or between % P_2O_5 in sheath and % reducing sugars in sheath.

3128. Hes, J. W.
The effect of arrowing on the yield of cane.
Sugar J., 1951, **14**: 4: 10-13, 16-17, bibl. 8.

In a review of the literature supplemented by his own observations in Java the author discusses variations in seasons of arrowing in relation to latitude and to the time of planting, variations between varieties and in a given variety in different localities and the effects of arrowing on cane tonnage, sugar percentage and sugar yield. A critical study of all the available information remains to be undertaken. For lack of evidence to the contrary it is suggested that the curve of sucrose accumulation and subsequent decline in an arrowing stalk is essentially the same as that in a non-arrower but the decline starts earlier; thus the difference in percentage sucrose between an arrower and a non-arrower depends entirely upon the moment the analyses are made. The detrimental effects of arrowing on both cane tonnage and percentage sugar can only be minimized by well organized maturity sampling so that the cane can be harvested when the average sugar percentage for a field reaches its maximum.

3129. Maier, E. A.
A story of sugar cane machinery.
Sugar J., 1951, **13**: 11: 19-21, 32; 1951, **14**: 1: 18-20, 34, 36; **14**: 3: 44-7; **14**: 4: 18-21; **14**: 5: 18-23; **14**: 6: 10-12, 32; **14**: 7: 17, 20-1, 36; 1952, **14**: 8: 13-15, 31; **14**: 9: 24-8; **14**: 10: 14-19; **15**: 1: 21-3, 30-3, illus. throughout.

These articles, soon to appear in book form, are the result of a life long study by the author of sugar cane mechanization in Louisiana. The first 11 chapters are concerned with the Louisiana cane growing areas (with particular reference to drainage), a historical account of progress in mechanization, tractive power, planting, early spring work, fertilizer application, cultivation, special machinery (drainage, aircraft, herbicide sprayers, rotary hoes), cutting sugar cane and types of loader.

3130. Anon.
The rotavator: an efficient field equipment.
Sugar, N. York, 1951, **46**: 12: 48-9, illus.

A brief description, with illustrations, is given of the Rotavator, manufactured by Rotary Hoes Ltd. The rotary cultivator is mounted on a crawler or other tractor and has been successfully used to break up and bury old cane stools and trash. By removing the centre flange it can be converted into a two row cultivator.

3131. Cooke, A. H.
Mechanical cane harvesting in Australia: the Moloney harvester.
Sugar, N. York, 1952, **47**: 2: 43-4, illus.

The Moloney is the most widely used cane harvester in Queensland. It is fitted to the side of a tractor and the rotating topping knives can be adjusted for topping stalks at 3 to 13 ft. The cane is spilled onto the ground behind the harvester, either lengthwise or in a herringbone pattern. Two men operate the tractor and harvester and outputs exceeding 100 tons an hour have been attained with some models. Costs vary from 3d. to 9d. per ton compared with 10s. for hand labour.

3132. Chona, B. L., and Rafay, S. A.
Studies on the sugarcane diseases in India. I. Sugarcane mosaic virus.
Indian J. agric. Sci., 1950 (issued 1951), **20**: 39-68, bibl. 20, illus.

Studies extending over 5 years are reported. Three strains, X, Y and Z, of sugar cane mosaic virus have been distinguished which differ in respect of thermal death points, amount of dilution tolerated and length of survival. They were not filterable. The virus complex *in vitro* lost viability within a few hours at 30°-32° C., but at 5°-6° C. survived for 8 days in extracted juice and for 15 days in leaves. Leaf patterns produced by mosaic varied greatly with varieties and seasons. Weather conditions had a marked effect on the success of artificial inoculations, the hot, dry months of May and June being most suitable; the optimum temperature for transmission was about 32°-35° C. The virus was readily transmitted from one cane variety to another and to maize and sorghum and from these plants back to cane. It was not transmitted by seed. When mosaic juices of Co. 213, 313 and M. 16 were mixed with healthy juice of the

same variety there was a decline in virulence, but this did not occur with other varieties whether susceptible or resistant. Mosaic infected leaves had an average of 20% less chlorophyll than healthy leaves in June but by October the difference had almost disappeared. However, old leaves from which mosaic symptoms disappeared still contained viable mosaic. The age of the plant had no effect on the virulence of the virus. The reactions of the virus to centrifuging and to alcohol, toluene, carbolic acid, formaldehyde and chloroform were also tested.

3133. Chona, B. L., and Rafay, S. A.
Studies on the sugarcane diseases in India. II. The phenomena of natural transmission and recovery from mosaic of sugarcane.
Indian J. agric. Sci., 1950 (issued 1951), **20**: 69-78, bibl. 9.

A proportion of the cuttings taken from mosaic-infected cane stools gave rise to healthy plants. The extent of this recovery varied with the variety, and from place to place and year to year. The variation in recovery in setts of the same variety from different localities suggested that more than one strain of the virus was involved. When mosaic-infected stalks of 5 varieties were each cut into 5 three eye setts the percentage recovery was generally higher in the setts taken from the lower, middle portion of the stalk than from either the top or bottom. The recovered plants did not show immunity. Although *Aphis maidis*, a recognized vector of mosaic, is fairly widespread in India, attempts to make it colonize cane were unsuccessful, and it is believed that another, so far unidentified vector may be responsible for some of the natural spread of the virus. In northern India natural transmission does not occur or occurs in only a few localities.

3134. Chona, B. L.
Studies on the diseases of sugarcane in India. III. Sources and modes of red rot infection.
Indian J. agric. Sci., 1950, **20**: 363-85, bibl. 17, illus.

Investigations over several years have shown that red rot, *Colletotrichum falcatum*, can be spread, not only in infected setts, but from soil containing infected cane debris and through irrigation water carrying spores, especially in July and August. Other findings were that infected setts give poor germination and that borers play little part in starting infection. The fungus was able to gain entry through the nodal regions, especially the younger, upper nodes, through the cut ends of the setts and through growth cracks in the rind. There was evidence of variation in resistance by different varieties to infection via the soil, setts and nodal regions. There were also differences in virulence between different isolates of *C. falcatum*. [See also 3171m.]

3135. Chona, B. L., and Munjal, R. L.
A new smut of sugarcane.
Curr. Sci., 1951, **20**: 301-2, bibl. 3, illus.

A smut disease observed on Co. 560 and Co. 561 is described. It is considered that the causal organism is *Sphacelotheca cruenta* which occurs on *Sorghum halepense*, one of the parents of these two canes.

3136. Mattos, R. A.
Antecedentes sobre el "carbón" de la caña de azúcar en el Chaco. **(Historical notes on smut of sugar cane in Chaco [Argentina].)** [English abstract 6 lines.]
Lilloa, 1949, **21**: 155-66, bibl. 9, illus., map [received 1952].

Sugar cane smut first appeared in the Chaco district of Argentina in 1941, and by 1948 it had become a disease of economic importance. Its distribution and importance throughout Argentina and in other countries are recorded. Notes are given on the susceptibility or resistance of the varieties grown in Chaco, where it has become necessary to replace the standard variety P.O.J. 36 by the more resistant Co. 290.

3137. Chona, B. L., and Gattani, M. L.
Kans grass (*Saccharum spontaneum* L.) a collateral host for sugarcane smut in India.
Indian J. agric. Sci., 1950, **20**: 359-62, bibl. 4, illus.

Cross inoculation tests have shown that smut, *Ustilago scitaminea*, attacking wild spontaneum canes is identical with that attacking cultivated varieties of sugar cane.

3138. Simmonds, F. J.
The small moth-borers of sugar cane, *Diatraea* spp., in Trinidad.
Trop. Agriculture, Trin., 1951, **28**: 80-95, bibl. 10.

An investigation was made of the position of the small moth-borers of sugar cane, *Diatraea* spp., and their parasites in Trinidad in 1947-49 when heavier outbreaks of borer occurred than had been seen in the island for some time. A survey of joint infestations suggest that the main cause of the outbreaks was the increasing use being made of the susceptible variety B.37161. A secondary cause on one estate was the use of long setts in planting. The survey did not support the belief that DDT dusting was responsible but it may have played some part in the increase. Variation in parasitism is discussed and an account given of new parasite introductions.—Commonwealth Institute of Biological Control.

3139. Verma, S. C., and Mathur, P. S.
The epidermal characters of sugarcane leaf in relation to insect pests.
Indian J. agric. Sci., 1950, **20**: 387-9, bibl. 4, illus.

The number of denticules on the lower surface of midribs of 9 Co. cane varieties ranged from 1 to 12 per 1 mm. length. A relatively large population of denticules was associated with resistance to attack by the top-borer, *Scirpophaga nivella*.

3140. Luke, W. J., Jr., and Ploeg, H. L.
***Heterotermes cardini*, a new insect pest of sugar cane and preliminary control studies.**
Proc. 1950 Mtg B.W.I. Sugar Tech., Jamaica, pp. 99-102, bibl. 1.

The termite, *Heterotermes cardini* Snyder, was found doing serious damage in over 500 acres of cane in Yngenio Santa Fe, Dominican Republic. In pot trials with BHC, chlordane, DDT, octalene and paris green, only octalene gave complete control. In a small, replicated field trial aldrin at rates of 0·5 to 2 lb. active ingredient per acre gave promising results. In a 10-acre

field test 2 lb. per acre of 25% aldrin wettable powder was blanket sprayed 2 days before cane was planted and normal germination occurred. Similar results followed the application of 10 lb. per acre BHC in the seed drills.

3141. RAO, G. N.
Control of termites in sugarcane.
Curr. Sci., 1951, **20**: 330-1, bibl. 1.
In 6 treatments compared for controlling termites in newly planted cane treating the setts for 24 hrs. in a 5% solution of Gammexane P.520 gave the best protection and did not affect germination adversely.

3142. (SOLOMON, S. E.)
The yearly yield and cane averages per acre.
Aust. Sugar J., 1952, **43**: 772-4.
Returns from 32 mills compiled by the Queensland Government Statistician include details of acreages and yields from 1911 to 1950. In the last year the average yield of cane was 25·38 tons per acre, the TC/TS 7·61 and the yield of sugar 3·34 tons per acre.

3143. GUILBEAU, W. F., BLACK, C. L., AND MARTIN, L. F.
A study of the processing of sugarcane on a pilot plant scale.
Sugar J., 1951, **14**: 6: 18-30, illus.
A pilot plant, designed by the Southern Regional Research Laboratory, New Orleans, is described with the aid of a ground plan. The object of the plant is to provide information on the factory behaviour of small quantities of different kinds, qualities and varieties of sugar cane. The results of processing experiments with 8 varieties are given, and it is pointed out that, while it is too early to draw final conclusions, the results agreed satisfactorily with those from factory processed cane.

3144. KHANNA, K. L., AND CHACRAVARTI, A. S.
Studies in the chemistry of sugarcane juice in relation to claribility in *gur* manufacture.
Indian J. agric. Sci., 1950 (issued 1951), **20**: 25-37, bibl. 11.
Investigations were made over 3 successive seasons to determine the chemical criteria associated with juices showing different degrees of clarification in the open pan system used to manufacture *gur*. It was found that juices that clarify well have small contents of total colloidal matter and also low contents of individual colloidal ingredients such as gums and pectin and low ash and high P_2O_5 contents. The reverse held good of juices that clarify poorly. Among 12 varieties tested Co. 313, Co. 508 and Co. 513 gave superior juices as regards clarification.

3145. WIGGINS, L. F.
Sugar cane wax. Part II. A survey of potential wax yields throughout the British Caribbean areas.
Proc. 1950 Mtg B.W.I. Sugar Tech., Jamaica, pp. 16-29, bibl. 5.
About 50% of the wax on the stems of sugar cane becomes dislodged during milling, the greater part of this becoming concentrated in the filter muds during clarification. The factors affecting the amount of wax present are indicated. Analyses of muds from different parts of the Caribbean show wide variation in wax contents from 14·7% of dry mud in Barbados, Antigua, St. Kitts and St. Lucia and 11·3% in Jamaica to 8·8% in Trinidad and 7·0% in British Guiana. The last two contain less on average than the economic minimum for extraction. It is suggested that the higher yields in the northern islands may be due mainly to drier climates and the predominance of the variety B. 37161 which appears to have a more waxy coating than most other varieties. Methods of extraction and potential yields and values are discussed.

Tea.

(*See also* 2058, 3170 l, o, p, 3171d, e, g, r, 3210.)

3146. MACALPINE, R. I.
Observations on manuring policy in the Darjeeling district with particular reference to the relative value of artificials and green crops.
Plant. Chron., 1950, **45**: 594-9.
Experience gained from experiments and observations on the use of artificial fertilizers on tea and on interplanting green manure crops is discussed, and it is concluded that for the Darjeeling district a combination of the two will probably give the best results on most estates. A method of treating *Tephrosia candida* and *Crotalaria anagyroides* is under trial whereby these plants are cut back to 6 in. from the ground in February-March and make coppice re-growth. A preliminary estimate showed crotalaria to yield about 7,000 lb. of green litter per acre from the first coppicing and about 3,000 lb. from subsequent loppings, which is a considerably higher quantity of litter than is provided by the usual system of periodic lopping. Coppicing can be repeated the following year 6 in. above the previous cut.

3147. HARLER, C. R.
The plucking of the tea bush.
Tea & Rubb. Mail, reprinted in *Plant. Chron.*, 1951, **46**: 426-8.
The author traces changes in methods of plucking tea over the past 100 years, and indicates some of the principles involved.

3148. DE JONG, P.
The removal of mosses and lichens from pruned tea.
Plant. Chron., 1951, **46**: 312-14.
In a small trial the tar-oil winter wash, Ovicide, applied to pruned tea at 1 in 20 or 1 in 15 at 15 gal. per acre gave as good a kill of mosses and lichens as the same concentrations or 2% caustic soda applied at 60-70 gal. per acre. In a subsequent trial the efficiency of Ovicide was increased by the addition of 1% white oil. There was no clear evidence that any of these treatments or treatments involving DNOC caused earlier bud-break.

3149. S[ARMAH], K. C.
Black rot (*Corticium invisum* and *Corticium theae*).
Serial Tocklai **8/1**, 1951, pp. 3.
This leaflet replaces Serial 8. Both fungi produce a similar effect on the tea bush, though their symptoms are distinct. As a palliative it is recommended to mark and record all diseased bushes at each plucking and the following day to spray them thoroughly,

particularly on the undersides of leaves, with a copper fungicide. In addition, areas affected with black rot the previous season should be sprayed twice at an interval of 2 weeks with a copper fungicide between mid-April and the end of May, a period which has been found crucial in the development of the fungi from the resting stage. In pruned areas painting the bark with a caustic wash will also aid control.

3150. DE JONG, P.
The use of seed dressings in the control of fungus diseases of tea seed.
Plant. Chron., 1951, **46**: 91-2.

Fungi found in association with tea seed that developed disease while germinating were usually *Fusarium* sp. and in a few cases *Diplodia* sp. and *Colletotrichum camelliae*. In a preliminary trial with seed dressings Agrosan G.N. and Fernasan were mixed with seed as dusts at the rate of 4 oz. per maund (82 lb.) and Agrosan was also applied as a liquid. The experiment failed to show fungicidal effects as the controls germinated normally, but an unexpected result was that seed treated with Fernasan germinated more rapidly than Agrosan-treated or untreated seed.

3151. PORTSMOUTH, G. B.
Report of the work carried out by the Tea Research Institute in connection with the control of the blister blight disease of tea during the period 1st April, 1950 to 31st March, 1951.
Tea. Quart., 1951, **22**: 137-41, bibl. 10.

Progress can be briefly summarized as follows: (1) Wet spraying with copper fungicides gives satisfactory protection and is economically practicable both for tea recovering from pruning and tea in plucking; (2) With the measures proposed, the temporarily permitted tolerance of 150 p.p.m. of copper should not be approached; (3) As regards dusting on an estate scale, much has still to be learnt. Of particular interest from the standpoint of work on other crops was the reasonable degree of protection obtained with spraying during quite heavy monsoon rain. A.C.S.

3152. PORTSMOUTH, G. B.
An estimate of the extent of crop losses on St. Coombs following the arrival of blister blight (*Exobasidium vexans*) in Ceylon.
Tea Quart., 1951, **22**: 90-2, bibl. 3.

The long term cultivation and weeding experiment was suitable for comparative purposes with its cultivation and manuring treatments unchanged over a long period and with a new cycle started early in 1947 when blister blight became apparent. Examination of the yields indicated that the loss of crop resulting from blister blight attack has averaged 20% (22% with the last 2 cycles). In corroboration, on the assumption that weekly spraying gives almost complete protection, results with a recent field crop protection experiment give an average blister blight loss of 23·5%. A.C.S.

3153. PFAELTZER, J. W.
Studies in blister blight control. VI. An evaluation of some commercially available fungicides for the control of blister blight.
Tea Quart., 1951, **22**: 52-5.

A large scale statistically randomized trial involving 188 formulations of 58 different fungicides is reported. The fungicides were compared in effectiveness with Perenox or Shell Copper; those giving a control of the same order as the standards include several copper compounds and also probably polysulphides (e.g. calcium polysulphide) and zinc ethylene bisdithiocarbamate. Investigations in progress have indicated several experimental materials which give equal control but at a lower dosage of active ingredient per acre. A.C.S.

3154. LOOS, C. A.
Studies in blister blight control. VII. Power dusting with " Cuprosana " dusts containing 2, 4 and 6 per cent of copper.
Tea Quart., 1951, **22**: 126-32, bibl. 2.

These trials were carried out during the June-September, 1951, S.W. monsoon, when weather conditions were unexpectedly rather unfavourable for blister blight. Dustings were approximately 5 lb./acre at 5-day intervals. Fairly effective control was obtained with the 6% dust in a swathe up to 50 yd. wide and with the 4% dust in a swathe up to 25 yd. wide. A.C.S.

3155. LOOS, C. A.
Studies in blister blight control. VIII. Trials conducted with the " Micron " power sprayer in connection with the application of oil-based copper fungicides.
Tea Quart., 1951, **22**: 133-6.

Trials with 5 proprietary formulations are reported. None proved suitable for blister blight control. Four formulations caused leaf scorch. Oil-based formulations cannot therefore as yet be recommended. The Micron sprayer in its present form would also appear to be unsuitable for spraying up-country tea. A.C.S.

3156. VENKATARAMANI, K. S.
A preliminary report on the trial of certain fungicides for the control of blister blight.
Plant. Chron., 1951, **46**: 270-2.

In trials in 1950 3 copper fungicides gave much better control of blister blight than 2 organic fungicides, YF2319 (80% TMTD) and R1334×14 (50% salicylanilide). The most effective concentrations of the copper fungicides were: Perenox at 2 and 4 oz., British Schering (80% Cu) at 2 oz. and Cuprokylt (50% copper oxychloride) at 4 oz. in 10 gal. water. A fuller report of this trial is to be issued.

3157. THOMPSON, A., AND JOHNSTON, A.
Blister blight of tea in Malaya. I. Interim report on investigations 1950-1951.
Malay. agric. J., 1951, **34**: 105-18, bibl. 4, illus.

A detailed interim report is given on investigations in 1950-51 since the first occurrence of blister blight, *Exobasidium vexans*, in Malaya in February, 1950; it is thought that spores were carried by wind from Sumatra, where the disease was reported in 1949. Moisture, high humidity and shade are the principal factors which favour fungus development; it was found that spore germination and leaf penetration do not occur unless there is a film of moisture present on the young leaf over a period exceeding 8 hr.; in consequence, the disease soon became widespread in the highlands, but in the lowland areas, where it appears occasionally, it does little damage. Regular spraying, after pruning, with a copper fungicide (Perenox, 4 oz.

in 10 gal. water) gave excellent protection. One important method of controlling the fungus is the removal of leaf, in the plucking rounds, before the blisters have sporulated; studies so far indicate that in Malaya a plucking interval of less than 12 days would normally be sufficient to achieve benefit by this method. Further investigations are in progress. A.C.S.

3158. HAWORTH, F.
Distribution of copper containing dusts.
Tea Quart., 1951, **22**: 118-20 plus graphs.
In connection with control of blister blight of tea, trials were carried out in a single track railway tunnel with 13 proprietary dusts. The results obtained show that the probable effective range of the dusts now available, using normal drift dusting technique, is around 200-250 feet. With the drift duster machine, certain dusts did not spread out very readily, thus tending to give heavy localized deposits of fungicides. A.C.S.

3159. DE JONG, P.
The problem of copper contamination in tea.
Plant. Chron., 1951, **46**: 619-23.
Analyses by the U.P.A.S.I. Scientific Department during 1951 suggest that so long as copper sprays and dusts for controlling blister blight are applied at recommended strengths and rates as soon as possible after each plucking there is little danger of copper residues in the manufactured teas exceeding the prescribed limits of tolerance.

3160. CARESCHE, L., AND METAYE, R.
Études concernant la lutte contre deux rhynchotes nuisibles au théier dans le Haut-Donnai. **(On the control of two pests of tea in the Haut-Donnai.)**
Arch. Rech. agron. Cambodge, Laos, Viêtnam **9**, 1951, pp. 31, illus.
The experiments described for the control of the tea mosquito bug, *Helopeltis theivora*, and the tea greenfly (leaf hopper) *Empoasca flavescens*, in south Vietnam, indicate that insecticides containing DDT or HCH may be effective. HCH preparations have an action practically equal to that of DDT against *H. theivora* and are cheaper. DDT, however, is more effective against *Empoasca*. HCH is recommended in wet seasons and DDT in dry ones. The amount of dust applied for mature tea bushes and containing 3% to 10% of the active constituent is 35 to 40 kg. per hectare, when used with hand dusters, but with power dusters the amount may be halved.

3161. DE JONG, P.
Low-volume spraying.
Plant. Chron., 1951, **46**: 648-50.
The times taken by 19 nozzles to empty a knapsack container working at pressures from 110 to 45 lb./sq. in. are tabulated, the lowest rates being in the region of 16 min. per gal. Only about 3 sec. are needed to spray the plucking table of a tea bush, and at an average stand of 2,800 bushes per acre the application rate for the finer of these nozzles ranged from 8·3 to 16·6 gal. per acre. Rates for tea at tipping were slightly higher.

3162. WEBBER, C. R.
Quick withering.
Tea Quart., 1951, **22**: 18-20.
This paper reports on about 2 years' practical experience with a quick withering unit completing withering in about 2 hours. On average, prices for " quick " and " normal " teas were practically the same. There is some indication that the quick withering treatment may destroy some quality in good teas and bring out some quality which poorer teas lack. With withering costs about the same, the main advantages with quick withering machines are savings in factory construction and upkeep. A.C.S.

Other crops.

3163. DORASAMI, L. S.
A brief note on areca industry in Mysore.
Mysore agric. J., 1951, **27**: 31-6.
Arecanuts are one of the most important crops of Mysore State. Cultivation is mainly confined to areas bordering on the Eastern Ghats and having an annual rainfall of 60-150 in. Plantains are used as a nurse crop. The elaborate methods of cultivation, irrigation and preparation for market are described. Average yields are 750 lb. per acre but good gardens give 1,250-1,500 lb. The different trade qualities of nut are enumerated and some trade statistics are given. Control of the " Koleroga " disease (budrot and nutfall) by spraying with bordeaux mixture, the use of artificial and green manures and the different cultivated varieties are discussed.

3164. SAYED, I. A.
Extension of the cashew nut cultivation and development of the cashew nut industry in the Bombay State.
Poona. agric. Coll. Mag., 1951, **41**: 237-47.
The tree's cultural requirements and its different commercial products (kernels, shell oil, ' apples ', and peel) are discussed. The estimated annual output of Bombay's 6 factories is 564,000 lb. of nuts. Ninety-eight per cent of India's cashew nut exports goes to the U.S.A. but demand exceeds Indian production and a considerable quantity is imported annually from Africa, mainly Portuguese East, for processing and re-export. Brazil is a potential competitor and if the Indian industry is to maintain its present monopolistic position it must be reorganized, mechanized and expanded. Recommendations are made for the attainment of these objects in Bombay.

3165. SINGH, L. B.
Propagating jackfruit, *Artocarpus integrifolia*, by air-layering with hormones.
Curr. Sci., 1951, **20**: 102-3, illus.
Two-year-old shoots of jackfruit were air-layered using sand and clay, with and without treatment with Seradix A and α-naphthalene acetic acid, both at concentrations of 0·05% and 0·025%. Clay and sand gave 48% rooted layers and 20% successfully transplanted at 3 months. The addition of the hormones at 0·025% increased rooting to 72% and successful transplants to 56 to 72%.

3166. SIDDAPPA, G. S.
Utilization of jack fruit and orange.
Indian Coffee, 1951, **15**: 130-2.
Trials at the Central Food Technological Research Institute, Mysore, have shown that jack fruit bulbs can

be successfully canned in syrup, and can also be used to prepare several other useful products. It has also been found that the Malnad type of loose skinned orange can be canned as segments or used for preparing squash or marmalade or for the production of a high quality orange oil.

3167. Cozzo, D.
Un sencillo método micrográfico para investigar las principales adulteraciones de la yerba mate. (**A simple micrographical method for investigating the main adulterations of yerba mate.**) [English abstract ½ p.]
Lilloa, 1949, **18**: 275-85, bibl. 30, illus. [received 1952].

A method is proposed for investigating the adulteration of yerba mate (*Ilex paraguariensis*) with plants belonging to other genera. It is based on microscopic observation of the vascular elements of the stem, which in yerba mate possess both spiral thickenings and scalariform perforations.

3168. Reitz, P. R.
As palmeiras de Santa Catarina. (**The palms of Santa Catarina [Brazil].**) [German summary 4 lines.]
Lilloa, 1949, **17**: 227-42, bibl. 7, illus. [received 1952].

Botanical descriptions are given of 11 species of palm found in the state of Santa Catarina, Brazil, together with notes on distribution and ornamental and economic uses.

3169. Mehta, P. R.
Some new diseases of plants of economic importance in the Uttar Pradesh.
Plant Prot. Bull. New Delhi, 1950, **2**: 3: 50-1, from abstr. in *Rev. appl. Mycol.*, 1952, **31**: 55.

A powdery mildew (*Oidiopsis* sp.) of *Zizyphus jujuba*, first noticed at Kanpur in 1946, is widely distributed and appears to be particularly severe in the western districts of the province, causing a brown discoloration and shedding of the young fruits. The course of infection extends from November to April, and there is reason to believe that mycelium overwinters in the new shoots arising annually during February. One application of sulphur dust in December gave satisfactory control in an orchard trial.

Noted.

3170.

a Agete, F.
Apuntes sobre la evolución de las variedades de caña en Cuba. (**Notes on the evolution of sugar cane varieties in Cuba.**)
Alman. agric. Cuba, 1950, 129-30, 132, 134, 149, from abstr. in *Turrialba*, 1951, **1**: 150.
Origin and importance.

b Baker, R. E. D.
West Indian cacao research—a progress report.
Trop. Agriculture, Trin., 1950, **27**: 227-30, reprinted in *J. agric. Soc. Trin. Tob.*, 1951, **51**: 155-61.
Review of the Cacao Research Scheme.

c Campinas Agricultural Institute.
Instituto Agronômico do Estado de São Paulo. Histórico, organização, finalidades. (**The Agricultural Institute of the State of São Paulo. History, organization and aims.**) [English summary 2 pp.]
[*Publ.*] *Secr. Agric. Brazil*, 1951, pp. 85, illus.

d à Campo, E. J.
Landbouwplannen voor Suriname. (**Agricultural schemes for Surinam.**) [English summary 1¼ pp.]
Landbouwk. Tijdschr., 1951, **63**: 371-8.

e Castagnol, E. M.
Problèmes de sol et l'utilisation des terres en Indochine. (**Soil problems and land utilization in Indo-China.**)
Arch. Inst. Rech. agron. Indochine **7**, 1950, pp. 61, illus.

f Chokkanna, N. G.
Soil conditions and plant growth in relation to coffee.
Indian Coffee, 1951, **15**: 180-2, 188, 197-9.
In South India.

g Ciferri, R., and Ciferri, F.
Reconocimiento de la explotación cacaotera de lo distrito federal y de los estados Carabobo y otros, en Venezuela. (**Cacao growing in the federal district, the Carabobo and other states in Venezuela.**)
[*Mimeo.*] *Suppl. Atti Ist. bot. Univ. Pavia*, 1950, **1**, pp. 78, bibl. 2.

h Cooke, F. C.
The coconut palm as a source of food.
Ceylon Coconut Quart., 1951, **2**: 153-6.

i Dufrénoy, M.-L., and Dufrénoy, J.
Trois siècles d'histoire du café. (**Three centuries of the history of coffee.**)
Rev. int. Bot. appl., 1951, **31**: 312-18, bibl. in text.
Its introduction to Europe, its effects and composition.

j Efferson, J. N.
Costs and returns for the Louisiana sugar cane industry from 1937 through 1949.
Sugar J., 1952, **14**: 10: 22, 41-8.

k Elgueta, M.
Un programa de selección para *Coffea arabica*. (**A programme for the selection of *Coffea arabica*.**) [English abstract ⅓ p.]
Turrialba, 1950, **1**: 37-43, bibl. 13 [received 1952].

l Fernando, T. M.
***Desmodium ovalifolium* as a cover crop for tea.**
Tea Quart., 1951, **22**: 49-50.

m Gorrie, R. M.
Soil erosion on gentle slopes and flat land.
Ceylon Coconut Quart., 1951, **2**: 165-7, illus.
Its control in coconut areas.

n GUNASEKERA, G. C. M.
Rotational grazing under coconuts.
Ceylon Coconut Quart., 1951, **2**: 181-3.

o HARLER, C. R.
The withering of tea leaf. A critical study of the first process in black tea manufacture.
Nyasaland agric. quart. J., 1950, **9**: 28-46.

p HARLER, C. R.
The sifting and packing of tea.
Tea and Rubb. Mail, 16 Aug. 1951, reprinted in *Plant. Chron.*, 1951, **46**: 539-46.
Methods and grades.

q HASTINGS, L.
Necesidad de laboratorios de prueba de semillas en los trópicos americanos. **(The need for seed testing laboratories in the American tropics.)**
Turrialba, 1950, **1**: 45-6 [received 1952].

r I., J. S.
The preparation of coir fibre.
Colon. Plant Anim. Prod., 1951, **2**: 117-19, bibl. 3.

s IRVINE, F. R.
Supplementary and emergency food plants of West Africa.
Econ. Bot., 1952, **6**: 23-40.

t KEHAR, N. D.
Food from waste—mango seed kernel.
Indian Fmg, 1952, **1**(n.s.): 12: 12-13, illus.
As stock feed.

u KRISHNAMURTI, B., AND APPANNA, M.
Occurrence, distribution and control of major insect pests of some important crops in Mysore.
Mysore agric. J., 1951, **27**: 1-23.
Some 100 pests of 30 crops are covered.

v LATHROP, E. C., ARONOVSKY, S. I., AND NAFFZIGER, T. R.
Increased profits from cane sugar by-products.
Sugar J., 1951, **14**: 1: 10-14, 26-33, bibl. 11.
Blackstrap molasses and bagasse.

w LATIF, M.
Imli (*Tamarindus indica*)—its uses and composition.
Punjab Fruit J., 1950, **14**: 48: 23-5, bibl. 8.

x LEROY, J.-F.
Un cas de polyembryonie chez *Zizyphus oenoplia* Mill. (Rhamnacée). **(A case of polyembryony in *Zizyphus oenoplia*.)**
Rev. int. Bot. appl., 1951, **31**: 328-9.

y LIVENS, J.
Exigences édaphiques des principales cultures tropicales. **(Edaphic requirements of the principal tropical crops.)**
Bull. agric. Congo belge, 1951, **42**: 295-308.

z MARTIN, L. F.
Utilization of by-products of Louisiana sugarcane.
Sugar J., 1951, **13**: 12: 26-7, 46-52, bibl. 9.
Including aconitic acid.

3171.

a MAYNE, J. E.
Mechanization in primitive agriculture.
Brit. agric. Bull., 1951, **4**: 95-100, bibl. 5, illus.

b MERRILL, E. D.
Readjustments in the nomenclature of Philippine *Eugenia* species.
Philipp. J. Sci., 1950 (issued 1951), **79**: 351-430, bibl. in text.

c MUIR, R. S. J., AND WADDELL, C. W.
The sugar industry of Australia.
Sugar J., 1951, **14**: 2: 7-11.

d ROBERTS, E. A. H., AND WOOD, D. J.
A study of the polyphenols in tea leaf by paper chromatography.
Biochem. J., 1951, **49**: 414-22, bibl. 16.

e ROBERTS, E. A. H., AND WOOD, D. J.
The separation of polyphenols in tea leaf by paper chromatography with water as a mobile solvent.
Abstr. in *Biochem. J.*, 1951, **49**: xxxiii, bibl. 1.

f SALGADO, M. L. M.
The manuring of underplanted young [coconut] palms.
Ceylon Coconut Quart., 1951, **2**: 161-4.

g SAUSMAN, V. A. N.
Some soil conservation aspects of tea planting.
Plant. Chron., 1951, **46**: 70-7.

h SCHAUFELBERGER, P.
Die praktischen Probleme der tropischen Bodenkunde. **(The practical problems of tropical soil science.)** [Summaries in French and English ½ p. each.]
Acta Trop., 1952, **9**: 1: 17-51, bibl. 39.

i SELVARATNAM, E. M.
Embryo of the coconut.
Nature, 1952, **169**: 714-15, bibl. 2, illus.

j STEVENSON, G. C.
New horizons in sugar cane breeding.
Proc. 1950 Mtg B.W.I. Sugar Tech., Jamaica, pp. 125-31, bibl. 17.

k STUDER, E. F.
Coffee shade.
Indian Coffee, 1951, **15**: 177-80.
Species used in Mysore.

l SYLVAIN, P. G.
Programa de investigación sobre fisiología del cafeto. **(A research programme on the physiology of coffee.)**
Turrialba, 1950, **1**: 88-91 [received 1952].
At the Interamerican Institute of Agricultural Sciences, Turrialba, Costa Rica.

m VASUDEVA, R. S., AND CHONA, B. L.
Fighting red rot epidemic.
Indian Fmg, 1951, **1**(n.s.): 6: 23-6, illus.
See also 3124.

n VERGHESE, E. J.
Green manure—the coconut growers' key to abundance.
Indian Coconut J., 1951, **4**: 235-40, bibl. 22.

o VAN DER VOORT, M., VAN ES, F. W. J., AND HAANTJENS, H. A.
Soil survey of the Mbai plain (North coast of Central Flores). [Indonesian summary 1 p.]
Contr. gen. agric. Res. Stat. Bogor. **124**, 1951, pp. 29.

p WELLCOME, H. S.
The cinchona forests of South America.
Sci. Monthly, 1950, **71**: 205-8, from abstr. in *Turrialba*, 1951, **1**: 159.

q DE WHALLEY, H. C. S., ALBON, N., AND GROSS, D.
Applications of paper chromatographic methods in the sugar and allied industries.
Int. Sugar J., 1951, **53**: 337-9, and 1952, **54**: 11-14, bibl. in text, illus.

r W[OOD], D. J., AND T[RINICK], J. M.
Packing of tea samples sent to Tocklai for tasting.
Serial Tocklai **88**, 1952, p. 1.
Steps necessary to avoid taints and damage.

NOTES ON BOOKS AND REPORTS

Books.

3172. (ASSOCIATION OF APPLIED BIOLOGISTS.)
Common names of British insect and other pests, Part 2.
Published for Ass. appl. Biol., 1952, pp. 40, 3s., obtainable from Miss B. M. Stokes, Ent. Dep., Rothamsted exp. Stat., Harpenden.

Part 1 of this list was published in 1947 and dealt with slugs and snails, eelworms, beetles, flies, sawflies, wasps and related insects. Part 2 comprises biting lice, thrips, shield bugs, capsids, etc., aphids, scale insects, hoppers, etc., butterflies and moths, fleas, mites of animals, mites of plants and food, and ticks. Each section is in two parts: (1) the scientific names in alphabetical order with the corresponding common names, and (2) the common names in alphabetical order with the corresponding scientific names.

3173. BOWLES, E. A.
Handbook of Crocus and Colchicum for gardeners.
Bodley Head, London, 2nd Edition, 1952, $8\frac{1}{2} \times 5\frac{1}{2}$ in., pp. 222, bibl., 30s.

Gardener or botanist, it is improbable that anyone can know more about the crocus than the author of this handbook. For 50 years the genus has been his particular study and during this time he has been responsible for the introduction of many rare species and the raising of a large number of exquisite hybrids, Snow Bunting and Golden Plover among them, to mention but two. On the botanical side his investigations have in another sense proved no less fruitful. The first edition of this book has been the standard horticultural work on *Crocus* since 1924. The present volume contains several new chapters, more illustrations, and has in fact been practically rewritten to cope comprehensively with the activities of plant collectors and systematic botanists. Crocuses are not difficult to grow but the choicer ones have a habit of disappearing after a year or so if left entirely to themselves. A few simple precautions, described with other cultural matters in the opening chapter will ensure their well being. By the planting of even those species currently offered by nurserymen an unbroken succession of flowers may be had in the open from September to March. Surprisingly, seeing the dearth of winter bloom in English gardens, autumn and winter flowering crocuses are seldom planted. Crocuses fall into a number of well-marked groups to each of which is devoted a chapter in which the species and hybrids, their origins and any special cultural needs come under close examination. Included is a learned chapter on "*Crocus vernus*, its name and history" by B. L. Burt. A short bibliography gives a few of the more important books and papers dealing with *Crocus* from 1542-1935. The genus *Colchicum* is reviewed in the latter part of the book. To the plain man this genus is remarkable for its enormous number of species all looking alike, though, of course, not to Mr. Bowles, who here successfully dispels the prevalent impression that when you have had one colchicum you have had the lot, for he discusses quite one hundred kinds before giving up. Synonyms are numerous and perhaps profitable, for in discussing that free-seeding variety *C. speciosum*, the author permits himself a little mild acidity with the remark that trade lists will doubtless always contain as many names as purchasers are willing to pay for. *Bulbocodium* and *Merendera* share a brief chapter. The illustrations, monochrome and coloured, are beautiful examples of the author's own work. The plates, though referred to by numbers, do not bear any, but are easily traced by other means. The index by W. T. Stearn deserves special commendation for its concise references to the books and periodicals where each specific name of *Crocus* or *Colchicum* was first mentioned. G.St.C.F.

3174. CHAPPLE, F. J.
The heather garden.
W. H. & L. Collingridge Ltd., London, 1952, 9×6 in., pp. 180, illus., 21s.

Those who want a garden giving colour and interest at all times of the year, with the least possible expenditure of labour, will find in the heather garden many fascinating possibilities. Mr. Chapple, who has been growing heathers for 25 years and now has an extensive heather garden in Derbyshire, gives us in this book the benefit of his long experience, of his interesting ideas on garden schemes, and of his refreshing enthusiasm.
He deals only with heathers hardy in this country. An early chapter on the growth and management of moorland heather, although largely irrelevant to the main theme, makes clear the importance of maintaining a bushy habit in the plant. In fact, the only routine garden treatment appears to be trimming off the dead flowers in spring to encourage compact growth. The simplicity of heather growing is emphasized throughout Thus, although four methods of propagation—seed, cuttings, layering and division—are described, the very simple technique of layering is recommended for most amateur purposes. The author vigorously explodes

the theories that lime-free soil and peat are essential to successful heather cultivation, and points out that some heaths will prosper even in calcareous soil, while moorland peat is generally too acid to be used undiluted in the garden.

In the chapter on schemes for the heather garden, the possibilities of using heaths and heathers in the rockery, borders and shrubbery or as edging plants, paths or hedges are discussed. Their variety of size and form, ranging from the 6 ft. high *Erica arborea* to the dwarf *Calluna vulgaris nana compacta* and the prostrate *Calluna* Mrs. Ronald Gray, offer infinite scope to the landscape gardener, and the imaginative rather than dogmatic approach of the author should infect many readers with his enthusiasm. One of the most pleasing and original suggestions made is that of growing a heather hedge, *E. stricta* and *E. vagans* being recommended because of their bright foliage and the pleasant reddish-brown of their faded flowers. Mr. Chapple does not belong to the purist school, who insist that heathers should be strictly segregated from other types of plants; indeed, he even devotes a chapter to other trees and shrubs, admittedly mainly ericaceous, that will associate well with heathers.

Much of the book is taken up with descriptions of the species and varieties of *Calluna*, *Daboëcia* and *Erica* (more than 200) which are listed in alphabetical order. Choice heathers have a chapter to themselves and, in addition, there are lists of varieties suitable for particular purposes, and a heather calendar showing the varieties which are in flower during each month of the year. As the book is intended mainly for gardeners, the varietal names familar to nurserymen are used in preference to botanical names in cases where these do not agree. The photographs, though unfortunately not in colour, illustrate many varieties and groupings admirably.

Many readers may be rather disconcerted by the popular, sometimes effusive style, and by the numerous quotations from literature and elsewhere, but it would be a pity if fastidiousness were to prevent them from enjoying this very informative book on an absorbing subject. P.R.-D.

3175. CHOUARD, P.
Cultures sans sol. **(Soilless cultivation.)**
Maison Rustique, Paris, [1952 ?], $7\frac{1}{2} \times 5\frac{1}{2}$ in., pp. 200, bibl. 46, illus., fr.600

The aim of this book is to supply reliable information on that much abused technique, soilless culture, and the reader will certainly find in it an unbiased, scientific account of the principles involved and a critical estimate of its value. Like the recent manual by Ticquet [see abstract 3187], it deals with the preparation and control of nutrient solutions, the various types of soilless culture, and cultural techniques, but, unlike Ticquet's book, the emphasis is on theory rather than practice. For instance, a long chapter is devoted to the physiology of growth and nutrition, and the chemistry of the solutions is dealt with in some detail, while rather less attention is paid to the specific problems with which the grower is likely to be faced. An exception to this slightly theoretical approach is the chapter on pre-germinating seeds for use as cattle fodder, a water culture technique which the author considers to be of great practical value; it is described very fully. This survey will give the student a comprehensive picture of the situation, and the grower a useful groundwork of information from which to tackle his own particular problems. P.R.-D.

3176. CLAPHAM, A. R., TUTIN, T. G., AND WARBURG, E. F.
Flora of the British Isles.
Cambridge University Press, 1952, $7\frac{1}{2} \times 5$ in., pp. 1,591, bibl. 46, illus., 50s.

The new Flora of the British Isles fulfils modern requirements, particularly since the rise of ecology as a special botanical study has led to the need for clear descriptions of species as an aid to exact identification of plants. The floras used by British botanists in the 18th, 19th and the first half of the 20th centuries have served a very useful purpose in stimulating interest in our native plants as living organisms and not merely as colourful natural objects, but recent investigation has provided even more biological information which was not available when the classical British floras were written. The aim of the authors of the new Flora has been to make accessible the increased knowledge gained since the time of Hooker, Babington, and Bentham; it is a most successful attempt to remedy our lack of a systematic account of our native flowering plants and ferns, and of a large number of other plants which have been " introduced " in various ways, or have " escaped " from cultivation and are now denizens of our hedgerows and woods or weeds of cultivated ground.

The arrangement is somewhat unorthodox; it begins with the Pteridophytes which are followed by the Gymnosperms, then the Angiosperms starting with the Ranales leading up to the Asterales (Compositae) and after these the Monocotyledons, ending with the Gramineae. A synopsis of the classification followed in the Flora is accompanied by an Artificial Key to Families, with the two primary headings: Plants free floating on or below surface of water: Land plants, or if aquatic, rooted at bottom of water. The metric system is used throughout for the dimensions of leaves, petals, fruit, etc. Information is given on distribution in and outside Britain, on time of flowering and fruiting, and on germination, pollination and the mechanism of seed dispersal; there are remarks on habitats, uses, and related garden plants, and introduced forms are indicated. An innovation for a field flora is the inclusion of the 2 *n* chromosome numbers in species where they have been determined. A glossary, preceded by three pages of explanatory figures, is appended, and there is a note on life forms as classified by the Danish botanist Raunkiaer.

At first sight it may be thought that a flora dealing specifically with native plants will be of little practical value to those whose chief botanical interest lies in the growing crop, but it must be borne in mind that cultivated plants have been derived from wild forms and that plant genetics must often include a study of natural species or varieties. Again, so much work has been done in recent years on selective weed-killers that the exact nomenclature of the weeds involved in any such investigation is a necessity. Moreover, seed characters and markings must be noted in the examination of seed mixtures and seed adulterations. The exact naming of certain wild plants is imperative, too, in a search for plants rich in drugs or vitamins. The

same is true in pathological and entomological studies, in as much as wild forms may be sources of fungous, pest or virus infections. Wild woody plants may sometimes serve as rootstocks for fruit trees or ornamental shrubs, and their recognition and descriptions are, therefore, desirable. In this connexion it may be of interest to note that 19 species and 2 hybrids of *Sorbus* are described in this flora.

The derivations of the generic names (as found, for example, in Hooker's flora) may be missed by those botanists who are interested in nomenclatural origins, but the omission is remedied by the recently published " Glossary of the British Flora " by H. Gilbert-Carter, which gives derivations of generic, " trivial " and varietal names in current British floras [see abstract 3181]. English names have been given wherever possible.

The book " is strongly bound, to stand up to hard wear and a long life, in a water-resistant cloth ". This is a great boon for field use. It is evident that this flora introduces a new phase in the study of wild plants, and it will be found indispensable not only for the " pure " botanists but also for those who are more interested in the applied, practical aspects of plant science. It will occupy a prominent place among other floras on library shelves, and its reasonable price (for a book of this calibre) will ensure its inclusion in many personal botanical libraries. H.W.

3177. COWAN, J. M.
The rhododendron leaf.
Oliver & Boyd, Edinburgh and London, 1950, 10×6 in., pp. 120, bibl. 61, illus., 21s.

This book, a study of the epidermal appendages found in the genus *Rhododendron*, is obviously the result of much painstaking work and presents a great deal of information and ideas which will be new even to many rhododendron enthusiasts. The remarkable structures of the various types of trichome are well described and in the main well illustrated, though the colour plates are disappointing. Some of the material in the earlier chapters, except an excellent one of the historical aspects, might well have gained through condensation, while the more important parts of the book which are concerned with taxonomy might have been extended. This applies particularly to the summary of *Rhododendron* series and their associated trichomes, where the accepted taxonomic arrangement would have been of interest as well as the alphabetical one given, and also to the rearrangements of series and subseries suggested in Chap. VII. The account of the development of the scales and hairs is rather sketchy, and the last chapter, on the physiological role of the trichome, is so highly conjectural as to detract from the value of the book as a whole; it was not necessary to have touched on so controversial a subject unless definite evidence from experimental work were available. The bibliography seems very limited and rather out of date for, while there are 21 references earlier than 1900, there are only 7 later than 1930, of which only 2 are since 1940. If this really reflects the literature, perhaps this book may stimulate research on the role of trichomes in general, as well as having a considerable effect on the taxonomy of the genus *Rhododendron*.

H.W.B.B.

3178. DIJKMAN, M. J.
Hevea. Thirty years of research in the Far East.
University of Miami Press, Coral Gables, Florida, 1951, 11×8½ in., pp. xxii+329, bibls. numerous, illus., $6.00.

It should be said at once that this is the most important book that has yet appeared on the scientific work so largely responsible for the rapid development of the great hevea rubber industry of the Far East. Everyone associated with tropical agriculture has known of the prominent part played by the Dutch in the improvement of this crop, but owing to the language barrier there are probably few among the English-speaking peoples who have realized how extensive, methodical and practical their investigations were. Dr. Dijkman, who himself worked on hevea for some years in Java, has now reviewed the results of 30 years of research in the Dutch East Indies up to its cessation in 1941 at the time of the Japanese occupation. This book, however, as Dr. Rands points out in his foreword, is much more than a mere review or condensation of the literature; the results of research are subjected to a critical interpretation which greatly widens its interest and value. Moreover, the author has given the work perspective by presenting evidence, where necessary, from other countries, notably Malaya and Ceylon, and by taking into account work, some of it of considerable interest, published since the war.

The book is divided into 17 chapters, each with its own bibliography. The first four may be regarded as introductory. They trace the history of the industry from the early exploitation of wild trees in Brazil, through the various introductions of hevea to Ceylon and the Far East, to the rapid development of existing industries from 1910 onwards. By the middle twenties rubber shared with sugar the position of the leading export crop in the Dutch East Indies, and by 1934 it had indisputably taken first place.

Each of the remaining chapters deals with a particular phase of research and development. Chapter V is devoted to soil management and fertilizer investigations, and includes a consideration of soil conservation practices and an account of the various plant species tested and used as cover crops.

Chapter VI summarizes studies on propagation by seed and budding, and includes a description of splitting very young hevea seedlings to provide twin plants and a note on Stahel's recent (1947) method of rooting cuttings under continuous water sprays. Then follow four chapters on the growth and physiology of hevea, which include accounts of tapping systems, the mechanism of latex production and flow, anatomical investigations on bark renewal and on the formation of latex vessels in the region of the bud union, and studies on the relationship between planting density and growth, yield and diseases. In Chapter XI the effects and control of pests, diseases and physiological disorders of rubber, which have already been the subject of lengthy books by Petch and Sharples, are discussed briefly.

The five chapters that follow cover 90 pages and are concerned with perhaps the most important contribution made by the Dutch to the rubber industry, namely, the production of high yielding planting material. Five stages may be recognized, the sequence of which

was governed largely by the economic needs of the expanding industry. The first stage, vegetative or clonal selection, was followed by generative selection leading to the production of superior seedlings. The results obtained from mother-tree selection were then examined and those obtained from both vegetative and generative selection compared, and lastly the performance of clones and selected seedlings was tested under commercial conditions. This work is described in detail and it is a tribute to its value that the clones produced are now returning to the Western Hemisphere to provide material on which to found a new industry in the native home of hevea. Work on the ecology of hevea, described in a final chapter, will also materially assist in this new development. The causes of differences in performance in Indonesia are examined in relation to such factors as rainfall and soil, and recent studies, notably by Baldwin and Seibert (both 1947), on the relationship between productive capacity, genetical constitution and the ecological factors affecting different *Hevea* species are examined.

The book closes with author and subject indexes and with 5 appendices. One of the latter gives illustrated descriptions of the 14 best commercial Far Eastern clones; another consists of a glossary of terms which will be welcomed by those people who habitually get confused by such terms as budded stumps and stumped buddings.

Dr. Dijkman has not only marshalled his data in an orderly fashion but, though writing in a foreign tongue, has, apart from a few lapses, kept the text simple, direct and to the point. The result is an account which should be readily understood by students, plantation owners and managers as well as by research workers. In addition those working on tropical crops other than rubber may well find inspiration for methods of approaching their problems from the example of the Dutch pioneers in the Far East.

It is sad that such a book should have been submitted to the indignity of a form of typewriter printing that is becoming all too common these days and to a paper which, while reproducing line drawings and print adequately, fails with photographs. G.K.A.

3179. Douglas, J. S.
Hydroponics. The Bengal system.
G. Cumberlege, Oxford University Press, Bombay, 1951, $7\frac{1}{2} \times 5$ in., pp. 147, bibl. 61, illus., Rs. 6, or 10s. 6d.

The first work on soilless culture in India was started in 1946 at the Government of Bengal's Experimental Farm at Kalimpong. It was realized from the start that the various methods used in Britain and America were unsuitable for Indian conditions, partly because the apparatus was unobtainable or too expensive, and partly because the methods were too complicated or were unsuited to the climate. If hydroponics were to be used widely in such a poor and largely uneducated country, it was obvious that a simple, cheap and outdoor method had to be developed. The Bengal system was therefore devised in which equipment was reduced to a minimum and full use was made of indigenous materials. It has now been tested in various parts of India, both on a commercial and amateur scale, with astonishingly good results.

The instructions given in this non-technical little book make it clear that success is within the reach of all. Containers may be made of almost anything except galvanized iron, mud plaster being specially recommended. The growing medium may be of any inert, non-toxic material, provided it consists of a mixture of coarse and finer particles, rock chippings and rock dust or broken brick and brick dust being suggested. The chemicals may be applied dry and watered in. The only modifications required during the monsoon rains are to decrease the number of waterings and to increase the frequency of fertilizer applications, at the same time increasing the proportion of potash. Indeed the method seems so simple that the sceptic may be pardoned if he anticipates that a few more years experience may bring to light some complications, such as the adsorption of nutrients on the porous types of growing medium.

Figures given of costs and returns and of yields per acre, however, bear witness to the tremendous economic possibilities of the method. The author claims not only that the Bengal system will make it possible to grow food cheaply in places that were previously unproductive, but also that the vastly increased yields per acre could make all large Indian cities self-supporting in vegetables, including potatoes, and practically so in rice, wheat and other grains.

For those who are interested in studying other systems of hydroponics, 3 appendices have been included, one giving brief notes on other methods and their merits and limitations, another listing the institutions engaged in soilless culture research, and a third giving a well-selected bibliography. P.R.-D.

3180. Frey-Wyssling, A. (Editor).
Deformation and flow in biological systems.
North-Holland Publishing Co., Amsterdam, 1952, $9 \times 6\frac{1}{2}$ in., pp. 552, bibl. 873, Fl. 38.

This book is one of a series of monographs on the rheological behaviour of natural and synthetic products and confines itself to some of the rheological problems in animal and plant physiology. Rheology is a new sub-division of physics, and its scope is neatly outlined in the title of the book. Its pertinence to many physiological problems is well set out by the ten contributors, but the particular fields which they have chosen are so detailed and varied that it is impossible for any one reader to have even a nodding acquaintance with the subjects of all the chapters.

The first chapter, by W. Seifriz, occupies nearly a third of the book, and discusses the properties of protoplasm that are relevant to a study of its movement, whether as the flow of a myxomycete, the streaming in plant cells or the contraction and extension of a muscle fibre. To do this Seifriz first describes the physical " constants ", which, when calculated for protoplasm, are shown to be so variable, and then considers the various theories on the physical structure and chemical nature of protoplasm that have been put forward to explain these peculiarities. The chapter forms an excellent review on the sub-microscopic structure of protoplasm. The second chapter, by M. G. M. Pryor, is concerned with the light thrown by thermo-dynamical studies of the action of muscle fibres on the possible mechanisms involved in their activities, and the third chapter, by A. Frey-Wyssling, begins with the structure

of cell walls in plants as determined by X-ray diffraction, optical properties and the electron microscope, continues with the determination of physical constants of the various cell wall components of individual cells, and finally describes measurements of the physical constants of entire plant tissues. These three chapters are concerned with the rheology of the cell, and occupy nearly half the book.

The next section consists of a further three chapters, the first by R. D. Preston on the movement of water in higher plants, in which much evidence damaging to the cohesion theory of the ascent of sap is brought forth. The second, by Frey-Wyssling, describes investigations into the flow of latex in rubber trees, and the third by J. J. Hermans, elaborates the mathematics propounded in the previous chapter.

The last section of the book proper is devoted to the translocation of solutes in animals and man, and discusses the flow of blood and lymph (L. E. Bayliss), cerebro-spinal and intra-ocular fluids (M. Amsler and A. Huber) and the rheology of secretions other than milk (G. W. Scott-Blair). A final chapter by P. Eggleton discusses the problems of diffusion in solvents and through membranes in plants and animals.

The book ends with a report on the 1st International Colloquium on Rheological Problems in Biology held in Lund 1950. Abstracts of papers, other than those given by the ten contributors above, are given and also a report of the discussion that followed each paper.

The impression left after reading the book is first one of gratitude that many physiological problems have been so clearly stated, followed by one of despair because such great specialization on any particular aspect seems necessary to solve the problem. It is to be hoped that the production of books of this nature will result in the cooperation of physicists and physiologists in the understanding of living phenomena. F.W.M.L.

3181. GILBERT-CARTER, H.
Glossary of the British Flora.
Cambridge University Press, 1950, $7\frac{3}{4} \times 4\frac{1}{2}$ in., pp. 79, bibl. 18, 8s. 6d.

This glossary aims at explaining the meaning, accentuation and derivation of the generic, trivial, and varietal names of plants mentioned in the current British Floras and in the new British Flora by Clapham, Tutin, and Warburg [see abstract 3176], the names of species being binary combinations consisting of a generic name and a trivial name. The method adopted for pronunciation and accentuation is set out in the Introduction, the chief points being these: For showing accents the long vowels have been marked and the short ones left unmarked. The plant-names are treated as Latin words and accented as such. In Latin the accented syllable is stressed. In a Latin word of two syllables the first syllable is accented. In words of more than two syllables the penultimate syllable is accented if if it is long. If the penultimate syllable is short, then the ante-penultimate syllable bears the accent. A "long" syllable is one containing a long vowel or diphthong or a vowel followed by two consonants. Certain exceptions to those general rules are mentioned. Most generic names are derived from Greek words and the Greek alphabet is set out, with notes on the pronunciation of certain letters. The trivial names are generally taken direct from Latin adjectives or are Latin combination words. It is recommended that for actual pronunciation of the letters the "restored" or "new" Latin pronunciation be used, for this is understood, up to a point, by all educated people wherever European civilization has spread. The approximate pronunciation of the letters, omitting diphthongs, however, in "restored" Latin is given on page XVIII. If this could come into general use by botanists in Britain it would lead to a more rapid understanding among themselves of plants under discussion and enable them to understand, and be understood by, botanical visitors from abroad.

It is debatable, perhaps, whether the method of indicating accents in this glossary is preferable to the more direct ones of using a dash (as in Hooker's flora, Jackson's glossary, and the new R.H.S. Dictionary of Gardening), or by a turned period after the vowel of the stressed syllable (as in the Shorter Oxford Dictionary). In the direct methods the accentuation is seen immediately and the rest of the pronunciation usually follows naturally. It is to be noted that a long vowel sign in the glossary does not necessarily indicate an accent. Thus in *Erigerōn* the accent is on the ante-penultimate *i*; the R.H.S. Dictionary and Hooker's Flora show it as *Erig'eron*, which, however, does not indicate that the *o* is a long one. Botanists will find that the derivations and meanings shown in the glossary are a great aid in remembering plant names, both scientific and common; thus the trivial name of *Ajuga chamaepitys* literally means "ground pine" the common name of which refers to the resemblance of the plant to a diminutive pine tree.

This glossary, as an attempt to regularize the pronunciation of plant names, will prove a great boon to all interested in botany, particularly now that intercommunication between British and foreign botanists is becoming more and more frequent, at meetings, conferences and international congresses. Moreover, many of the names in the glossary (especially generic names) come into "applied" botanical literature and discourses, and it is desirable that not only botanists but also agriculturists, horticulturists, nurserymen and gardeners (not to mention the general public) should have a common basis for naming plants. It would be a stimulus to the advancement of plant science, in all its branches, if an international pronunciation of plant names could be adopted, as suggested by this glossary. The reviewer would like to see the Introduction reprinted as a pamphlet and widely distributed, so that all who study or handle plants (whether wild or cultivated) could have an opportunity of acquiring a knowledge of how scientific plant names should be pronounced. H.W.

3182. GOFFART, H.
Nematoden der Kulturpflanzen Europas. **(Nematodes of the cultivated plants of Europe.)**
Paul Parey, Berlin, 1951, $9\frac{1}{2} \times 6\frac{1}{2}$ in., pp. 144, illus., bibl. 7 pp., DM. 18.

The appearance of a modern work on applied nematology is an all too rare event; a work embodying the wide experience of Dr. Goffart is therefore all the more welcome. The field covered is also wide, including the principal nematode parasites of cereals, fodder and root crops, oil seeds, flax, tobacco, hops,

pulses, a wide range of vegetables, some spices and top and soft fruits. Ornamental plants and forest trees are not included. Frequent reference is made in the text to the bibliography which contains approximately 200 papers. An introduction of some 30 pages, which includes a useful key to the genera, refers in general terms to morphology, biology, laboratory techniques and current methods of nematode control.

The system of classification by crop and symptom will enable many readers whose knowledge of nematodes is not profound to make intelligent use of the extensive information provided. Those wishing to learn more of the nematodes will find concise descriptions given in the text, in the section devoted to a typical host plant. These are clearly indicated in the nematode index by an entry in heavy type. There is also a host plant index, but the omission of a general index unfortunately prevents direct reference to the details of control measures and other aspects which are also given under crop headings. Although language difficulties will necessarily narrow the public of this book, it is a concise and, at present, unique work of reference of especial value to the horticulturist. R.S.P.

3183. GRAM, E., AND WEBER, A.
Plant diseases in orchard, nursery and garden crops.
Macdonald & Co., London, 1952, 11¾×8½ in., pp. 618, bibls, illus., 90s.

This book was written by two well-known Danish plant pathologists who undertook its preparation as long ago as 1933, but owing to wartime difficulties did not publish it until 1940. A second edition was soon required and it was issued with a few alterations in 1944. It has now been translated into English by Evelyn Ramsden and this new edition has been edited and adapted for conditions in this country by Dr. Dennis of the Royal Botanic Gardens, Kew. Many of the original illustrations in the text have been replaced by figures which are the property of the Department of Agriculture for Scotland and so are more illustrative of plant diseases found in Great Britain. The result is a large and heavy tome of over 600 pages. Its aim is to describe diseases of horticultural crops with recommendations for their control. Its five sections are devoted to: I. The nature of plant diseases, II. Diseases of tree and bush fruits. III. Diseases of vegetables and herbaceous fruits. IV. Diseases of ornamental plants and trees. V. Control. Each section ends with a comprehensive bibliography on the subjects discussed in that section. Under I is included an account of nutritional deficiencies and excesses, and certain diseases which are not specific to particular plants but have many hosts are described. In sections II, III, and IV, the host plants are arranged in alphabetical order, and for each important host there is a summary of its diseases forming a key for rapid diagnosis, and serving as an index to the various diseases. Section V includes descriptions of many chemical fungicides (also arranged alphabetically) mentioning several forms of sulphur, and some of the new synthetic organic preparations, together with a list of spreading agents. Summer spray schedules are set out for apples, cherries and plums (pp. 484-5).

The diseases of important fruit trees and vegetables are treated in detail, and the same may be said of those of certain ornamental plants which are grown co mercially; these are chrysanthemum, dianthus (c nation and pink), hyacinth, lily, narcissus, rose a tulip. The diseases of many other ornamental pla are also described but usually rather cursorily. A bo of this scope, including problems not yet complet solved and still under investigation, is bound to sh some omissions at the time of its publication. T English editor has been able to add much use recently reported information, but each reviewer w doubtless find that some diseases in which he is pa ticularly interested are omitted or only briefly me tioned. *Cylindrocladium scoparium*, for example, mentioned only in its relation to attacks on roses cause a rose canker. So far as the reviewer is awa this disease of roses, described in detail by workers the United States, does not at present occur in Brita or on the Continent; no mention, however, is mad of the same fungus as the cause of a serious wilt plum shoots in layered nursery rows, as reported, so years ago, at East Malling and recorded in Holla On the other hand there are references to rece observations on virus diseases of apple trees in Europ and to trials with synthetic organic fungicides carri out by Marsh (1947) at Long Ashton, though t more recent work on similar lines by Byrde (1949-5 was apparently published too late for inclusion.

The book is copiously illustrated with 10 coloure plates, and with 343 text figures, some very goo others not so successful. The rather thick glos paper was probably used in order to bring out deta in those text figures reproduced from photograph but it has the disadvantage of producing a very lar and heavy volume (weight 5¾ lb.), which is thus not handbook to be picked up casually, but one for t table. Its high price precludes its purchase by t impecunious student, and it is doubtful whether the are many growers, nurserymen, smallholders,' a market gardeners, for whom the book is intende who will themselves feel justified in buying it. Ho ever, with its numerous illustrations, chosen to a recognition of the diseases rather than the parasites, i practical recommendations, and much information n readily available elsewhere, this book will be pa ticularly useful to advisory officers, and it should available for consultation in every library. H.W.

3184. HELLYER, A. G. L., (SANDERS, T. W.).
Sanders' Encyclopaedia of gardening.
Collingridge, London, 1952, 8½×6, pp. 524, 20s.

Should Sanders' Encyclopaedia ever require a mot for its title-page, " Here we are again " would surel be appropriate. For indeed here it is again, makin in fact, its 28th appearance on the horticultural stag Rooted in antiquity it may be, but age, it seems, cann wither it nor custom stale the infinite and—if the infini can increase—the increasing variety of its content Of late years a kind of botanical witch hunt ha developed. In the sacred cause of " Priority " plan bearing respected names known to generations gardeners have been subjected to a Gestapo-lik scrutiny, their names, as like as not, declared to b phoney, and they have been reissued with strang appellations, which, though justifiable by the rule first come first served, merely bemuse the practic

gardener. To him Chamaecyparis will remain Cupressus to the end of time, the bickerings of botanists notwithstanding. An Encyclopaedia must be up to date, the new names must be used, but far from adopting a take it or leave it attitude the Editor has gone to considerable pains to explain in a lucid foreword the methods employed in naming plants and the reasons why changes are inevitable. And to make everything easy the old familiar names, now rather callously referred to as " synonyms ", are also listed in their appropriate places. This book is really a dictionary of cultivated plants and a very complete one. In the brief notes on cultural needs which accompany each genus the old careful directions for the mixing of individual soil composts have been retained, and wisely. For although readers are assured that John Innes standard compost will grow almost anything, who wants to believe that, when half the joy of gardening, as many see it, lies in compounding special mixtures to tickle the palates of their difficult beauties ? Beyond this details of garden practice are not described, such practical matters being dealt with in a companion volume " The Encyclopaedia of garden work and terms ", but guidance is given on such matters as planting, colour, height, suitable soil, pruning, manuring, and where necessary, temperatures for greenhouse cultivation. A useful work of reference at, for these days, a reasonable price. G.St.C.F.

3185. LAWALRÉE, A.
Flore générale de Belgique: Spermatophytes Vol. I, fasc. 1. (**A general flora of Belgium: Spermatophytes Vol. I, No. 1.**)
Minist. agric. Jardin bot. État, Brux., 1952, 10×6½ in., pp. 170, illus.

The first volume in this series, *Pteridophytes*, was published in 1950 [see *H.A.*, 21: 2128]. The present volume, part of a flora of the Belgian Spermatophytes, is arranged on the same taxonomical lines, information being given as before on morphology, distribution, habitat, common names, uses and variability of each species. This number covers the Gymnosperms and the Angiosperm families Salicaceae, Myricaceae, Juglandaceae, Betulaceae, Fagaceae, Ulmaceae, Cannabaceae, Urticaceae, Santalaceae, Loranthaceae and Aristolochiaceae.

3186. LOADS, F. W.
Tomato culture by modern methods.
C. A. Pearson Ltd., London, 1952, 7½×5 in., pp. 176, illus., 12s. 6d.

Written for the amateur with little experience and limited facilities this book gives much sound, homely advice. Two thirds of the text is devoted to glasshouse culture, the rest dealing with tomato growing out of doors, in frames and under cloches, simple methods of water, sand and aggregate culture, exhibiting tomatoes and saving seed. In spite of a rather confused style and many misprints the book should prove a useful guide to its subject.

The reader is started very firmly on the right road with a thorough spring- (or rather winter-) cleaning of the greenhouse. The emphasis that is laid throughout on glasshouse hygiene should impress even the happy-go-lucky gardener, and may, in practice, compensate for some shortcomings in the section on disease control. In this chapter, for instance, there is no mention of that only too common trouble, damping-off, and although reference is made to it elsewhere the reader is nowhere informed of the value of Cheshunt compound as a preventive. The rather unconventional suggestion is made that dilute solutions of permanganate of potash applied 3 times throughout the season should prevent any fungus infection, and indeed the author claims that his plants, so treated, have never suffered from any disease over a period of 32 years.

In the chapters on cultivation the author considerately bears in mind the facilities which the ordinary gardener has at his disposal. For this reason he departs from the " well-rotted turf " tradition, recommending the use of good garden soil in potting composts, and suggests that the wholesale replacement of soil in beds may be more practicable than sterilization. In general the methods recommended are reliable, simple and based on long practical experience. The use of warm water for seedlings, however, is an unnecessary refinement, as work at John Innes has shown. For a book describing modern methods it is surprising that there is no more than a passing reference to the use of electrical soil warming, which is of particular value to amateurs. Methods of training appear to be a special hobby of the author and several interesting systems are described, including the 3-stem system for bush tomatoes, horizontal training for plants in frames, fan training for plants in pots, and layering to produce a succession of upright sideshoots from one stem.

The diagrams and photographs are generally very helpful and supplement the detailed descriptions given of cultural operations. P.R.-D.

3187. TICQUET, C. E.
Successful gardening without soil.
C. A. Pearson Ltd., London, 1952, 7½×5 in., pp. 176, bibl. 27, illus., 10s. 6d.

This manual on the technique of soilless culture, written by the Secretary of the Soilless Culture Society, is essentially practical. It deals simply and thoroughly with the various methods of water-, sand- or gravel-culture that can be used by the amateur or commercial grower, and with the many problems he is likely to encounter. Methods of calculating, mixing and managing the solutions are described with the least possible technicality. The author points out, however, that although soilless culture works well if properly managed it is more difficult to produce results with this method than with soil. Far from glossing over the difficulties, he had deliberately drawn attention to the pitfalls and shows how they can be avoided.

The sound, practical advice given by Mr. Ticquet is just what is needed to guide the beginner in this new technique. The book should do much to counteract the extravagant claims and consequent mistrust from which soilless culture has suffered. P.R.-D.

3188. WALKDEN, G. B.
Gardening in pictures.
Collingridge, London, 1952, 8½×6½ in., pp. 96, illus., 10s. 6d.

This may be a book for the beginner, as the author says, but it is also a book from which everyone who takes his gardening at all seriously can learn. The ordinary routine of gardening operations may be familiar to most; what is less familiar is how best to perform them with efficiency, neatness and despatch.

Despatch does not mean hurry. A gardener who hurries is no gardener. It means a saving of time through ability to do a thorough job without unnecessary bumbling. The gardener is in fact shown how to become a craftsman and here it it mostly done by pictures. On the principle that deeds speak louder than words the text has been reduced to a minimum and instead, the progress of the operation is photographically illustrated from start to finish. A photograph has this advantage over a sketch, that although a sketch may at times stress an important feature with greater definition or clarity it tends to be regarded as a counsel of perfection or perhaps a comfortable illusion on the part of the artist, but a photograph inspires confidence. The camera does not usually lie, even if the retoucher does on occasion, thus the reader has no secret doubts as to whether this or that is possible, he sees that it is and what one man can do so can another. To say that the operations, some 19 of them, are illustrated from start to finish is no exaggeration. The actions, some of them, one would think, largely subconscious, involved in the sowing of seeds in pots and boxes are shown in 24 photographs and other work is just as thoroughly pictured according to its need. Nothing is left to the imagination. The slipshod and the shirker can never say with truth " I wasn't told ". The text very briefly summarizes each operation but is mainly concerned in explaining matters that cannot conveniently be illustrated, and that it does very well. It is a miniature reference work in itself. To ensure that no available space is wasted, tables of sowing and planting times of vegetables, annuals, bulbs and perennials occupy the end papers. After learning and practising the drill as laid down in this manual, the reader, as concerns gardening, should feel competent to tackle anything. G.St.C.F.

3189. Wood, R. C. (Compiler).
A note-book of tropical agriculture.
Imperial College of Tropical Agriculture, Trinidad, 5th edition, 1950, $6\frac{1}{2} \times 4\frac{1}{2}$ in., pp. 147, 7s. 6d.

The appearance of the fifth edition of the late Professor Wood's useful little reference book can be welcomed, but this welcome must be tempered to some extent by the realization that in certain respects it is becoming rather dated. The new edition is essentially the same as the original version which appeared in 1933, though, strangely enough, it contains fewer of the blank pages on which the students, estate managers and the many others who used it as a guide and friend in need could make supplementary notes and so keep it abreast of developments. It is true that much of the basic information on weights and measures, seed rates and yields, manures and the like does not change appreciably with time, but among formulae for insecticides and weedkillers for example it might by now be reasonably expected that some mention would be made of derris and DDT and perhaps also of BHC, MCPA and 2,4-D. The section on mensuration and surveying might now also usefully include data on measurements commonly used in soil conservation, while that on statistics could well advance a bit beyond the stage of straight analysis of variance of simple randomized block and Latin square designs. As a horticulturist one might be forgiven for feeling that the time had come when such fruits as citrus and mangoes should be lifted from the ranks of the also-rans. The task of revision will not be an easy one, because it is essential that a pocket note book of this type should not become too bulky, but dare we risk the ire of our colleagues at Aberystwyth by suggesting that parts of the section on minor field crops might be omitted or at least pruned. As one of the early users of the notebook your reviewer is glad to see it still going strong, and hopes that it will not be long before a sixth edition appears with something of a " new look " about it.
G.K.A.

Reports.

3190. Algérie, Gouvernement Général.
Rapport du Conseil de l'Experimentation et des Recherches agronomiques pour 1950-1951. **(Report of the Council for Experimentation and for Agronomic Research for 1950-1951),** Algiers, 1951, pp. 212.

Much of this long report is concerned with horticultural crops and it is only possible to mention the following items briefly. *Pulses:* Large collections of lines and varieties are being studied in lentils, beans, haricots and peas. *Potatoes:* Variety trials are described with both early and late varieties. *Tobacco:* In addition to several variety trials cultural trials on Spada 11/15 are reported. A population of 32,250 plants per ha. gave appreciably better results than populations of 26,600 or 41,500. Early and hard topping proved beneficial. Trials have also been made on seedbed disinfection and on drying. *Vines:* Trials have been started on the tolerance of vine rootstocks to available lime in calcareous soils, on the improvement of varieties by clonal selection and on the performance of 4 hybrid vines on 5 rootstocks; in the last of these the percentage take of buds has been good on 41B but poor on 31 Richter. A vine collection has also been established. *Dates:* From controlled pollinations and preliminary fruit shedding counts it would appear that Deglet Nour flowers remain receptive for up to 12 days, Mech Degla for 8 to 10 days and Ghars for 6 days. In trials with Deglet Nour dusting the flowers with pollen and the traditional method of using spikelets gave equal results during the first 8 days after the spathes opened, from 9 to 12 days dusting gave better results, after 12 days neither method produced good fertilization. Mechanical pollination has been extended with success, 2 men being able to fertilize about 2,000 palms a day. Attempts to economize in the use of pollen by diluting it with lycopodium powder have not given good results. When bunches were shortened to one-third or thinned to one-third neither treatment had an appreciable effect on the mean yield compared with controls, but thinning resulted in earlier and more uniform maturity, 13% more first quality dates and a higher net monetary return than no thinning. *Citrus:* Among various trace elements applied to clementines showing deficiency symptoms only Mn has had a positive effect. In previous years determinations for the maturity of oranges were based on the mixed juice of 5 fruits, but the method was shown to be defective; analyses of single fruits from the same tree have now shown that very considerable variation exists and that to operate within a probability of 95% as many as 33 fruits would

be needed for a sample. In dipping trials using various fungicides against penicillium moulds borax, borax + boric acid, and bicarbonate of soda reduced infection appreciably in fruits stored for 25 days at 44° C. but had very little effect when fruits were stored at 22° C. *Pistachio:* The best time to sow seeds of *Pistacia vera* proved to be the second fortnight in March. Seed treatment with Sanigran and soil disinfection did not reduce rotting. Attempts at grafting *P. vera* on *P. atlantica* were unsuccessful. *Figs:* Several aspects of drying are under investigation. *Floriculture:* Considerable experience has been gained on the cultivation of carnations in the open and on the best varieties. With roses the most satisfactory out of 150 varieties under trial are listed. With gladiolus several experiments were concerned mainly with winter flower production. Mention is also made of trials with tulips, narcissi, cannas, arums and dahlias. *Tomatoes*: Trials have been made on early spring varieties, varieties suitable for processing, and varieties for autumn cropping. *Sweet potatoes:* Of 20 American varieties only Yellow Strasburg, Pelican Processor and Southern Queen equalled local standard varieties. *Strawberries:* 50 varieties are under trial. *Phytohormones:* Treatment with 5 hormones did not ensure rooting in cuttings of the vine Berlandieri and some of its hybrids. No definite effect was found in the use of dinitro compounds to thin out blossoms of the Eureka lemon. Attempts to encourage parthenocarpic fruit setting in clementines and mandarins with 3 hormones were unsuccessful, though with mandarins 2,4-D reduced the number of seeds by 27%. With potatoes glycol monochlorhydrin and methyl bromide in particular accelerated germination. Several substances, of which the most effective was 2,4-D, reduced the phytocidal action of oil sprays used on citrus. The susceptibility of a large number of weeds to 4 selective herbicides is indicated in a table. *Parasitology:* Investigations are reported into the control in vines of cockchafer grubs, mildew, oidium and infectious degeneration; with oidium it has been found that plants can be fully protected by using not more than 60% of the sulphur usually applied; with infectious degeneration the disease was transmitted from diseased shoots to healthy grafts and in plants raised from infected cuttings. In trials to control codling moth on apples and pears DDT was only slightly less effective than lead arsenate; of 3 baits tried fermenting molasses in water proved the most attractive. The periods during which the fruits of several orange and mandarin varieties were susceptible to attack by fruit flies were studied as were other factors affecting the incidence of the pest; in trials with DDT and SNP sprays remained effective longer than dusts and DDT than SNP. Extensive trials reported on the control of scale insects included the use of systemics. *Agricultural industries:* An investigation into the effect of new insecticides on the quality of wine showed that while Lethane and DDT could safely be used, HCH imparted an off-flavour and Biquinze, a fluosilicate, upset fermentation and introduced toxic quantities of fluorine.

3191. Barbados.
17th Annual Report B.W.I. Central Sugar Cane Breeding Station, Barbados, for the year ending 30th Sept. 1950, [1951?], pp. 48.

Details of the crossing, selection and trial of sugar cane varieties are reported as for previous years. Unusually dry weather in the first 5 months of the year followed by excessive rainfall in August, September and October depressed flowering and thus enhanced the performance of varieties that tend to flower too freely. In third year seedling trials with plant canes B.46397 and B.46223 were outstanding and B.45151 and B.45152 also performed well. Among first ratoons only B.45267 of the B.45' series was better than the standards B.37161 and B.4098, but among earlier selections B.41211 and B.41227 were outstanding in all trials. Among second ratoons in a single trial of the B.44' series several canes compared well with the standards, notably B.4466 and B.44341. In select seedling trials the outstanding variety was B.41211; the same could be said for B.41227 in Barbados if it did not flower so profusely. The performance of varieties in the contributing colonies is discussed. In Barbados the main varieties grown were B.37161 (84·76% of the total acreage), B.41211 and B.4098; in Jamaica B.34104 (54%), B.3439 (22%) and B.37172; in Trinidad B.34104 (36·5%), B.3337 (29·2%), B.37161 and B.37172; in British Guiana B.34104 (67·4%) and D14/34; in Antigua B.4098 (67·13%) and B.37161; and in St. Kitts B.37161 (94·29%). In mosaic disease trials difficulty is still being experienced in the inoculation of new seedlings undergoing tests, and it is concluded that the Barbados strain of mosaic, or, at least, the material being used, is losing its virulence. In the field mosaic has almost disappeared in Barbados since B.37161 was widely adopted; this variety, though susceptible, does not appear to be affected by the disease to any extent. A cytogeneticist has been appointed and the work of the station will be extended in future to include cytological examination of breeding material and the production of pure lines by selfing and sib-crossing.

3192. Botley (Cheal, W. F.).
*Report of Botley Fruit Station for 1950,**
1951, pp. 24, bibl. 17, illus.

The winter of 1949-50 was particularly favourable for the development of red core disease of strawberries in the succeeding season. A very seriously damaged plot of Madame Lefebvre was ploughed up immediately after harvest and part of it subsequently re-planted with 10 varieties to determine their susceptibility. Pot experiments were conducted with Climax strawberries in soils heavily impregnated with green manures. Observations to date do not indicate any outstanding effects from the various types of green manure used. Plants on raised beds grew considerably better than those planted on the flat. Further evidence is presented supporting the theory that summer or sudden wilt is primarily caused by adverse soil conditions [see *H.A.*, 20: 1479]. Other work reported includes sewage compost preparation and early strawberries under cloches.

3193. Canada Department of Agriculture.
Directory of Organization and Activities of the Canada Department of Agriculture,
1952, pp. 53.

At present the Department of Agriculture is constituted

* Formerly *Report on Investigations on South Hampshire Strawberry Problems.*

on the basis of 6 subdivisions, Administration Service, Science Service, Experimental Farms Service, Production Service, Marketing Service and Special Act Administrations. A brief outline is given of the functions of the individual services and their sections, followed by a staff list.

3194. Canada, Dominion Bureau of Statistics.
The Canada Year Book 1950.
[*Publ.*] *Dom. Bur. Statist. Ottawa* **D.B.S. 4-1100P,** 1950, pp. 1,238, maps, $2.

In the section on Agriculture (pp. 399-457), a summary is given of the research programme of the Department of Agriculture, and statistics are presented of the estimated commercial production and value in recent years of various fruits, maple sugar and syrup, and tobacco.

3195. Chavancy, A. (Blao, Indo-China.)
Compte-rendu des travaux du Centre d'Expérimentation agronomique de Blao en 1947-1948 et 1949. **(A report on the work of the Blao Agronomic Research Station in 1947, 1948 and 1949.)**
*Arch. Rech. agron. Cambodge, Laos Viêtnam,** **10,** 1951, pp. 76, plus maps, graphs and illustrations.

The main crops being studied at the station are tea, coffee, tung, hill rice, cover and green manure crops, peppers, fodder crops and ramie. Plant collections include 32 varieties of tea, and 18 varieties of arabica and 34 of robusta and excelsa-type coffees. *Cover crops:* Among the many species tested *Aeschynomene wrightiana* (Leguminosae) has proved the best plant for regenerating degraded red soils, followed by *Tithonia* sp. (Compositae). The latter has proved of value as a green manure crop in young tung plantations and also for the provision of material for mulching. *Tung:* A large collection of illegitimate lines of *Aleurites montana* has been formed, and methods used to raise, plant out and manure seedlings are described with notes on cover crops under trial. Preliminary records show that tung trees make excellent growth on red dacitic soils. *Peppers:* Plants of *Piper nigrum* were introduced from Indonesia in 1947 and subsequently the collection has been extended with other introductions and with local wild peppers, *Pseudo-Piper* sp. Early field trials, confirmed by pot experiments, showed that phosphatic manures were essential to the growth of peppers on the red soils of the station. A manurial programme which has proved successful is set out. It involves a basic dressing followed by periodic applications of a nutrient solution. The local wild peppers are of interest because of their vigour and health, and preliminary trials have shown that other peppers can be readily grafted onto them. Experiences gained on soil and compost mixtures used in seed boxes and in methods of planting in the field are recounted. *Experimental work started in 1950:* With tea complete fertilizer is being compared with liquid manure obtained from composted *Tithonia* sp. with and without added phosphate. Methods of composting *Tithonia* sp. are described. With ramie 4 varieties are being compared. With citrus difficulty has been experienced in obtaining fruit of good quality from oranges, lemons and mandarins, but grapefruit has been very satisfactory in this respect. Among citrus rootstocks certain local oranges (Srebo, Laouan, Yaback and Giaray), Japanese lemons and shaddocks, particularly the sour shaddock, are of interest, and in 1950 plots of grapefruit budded on Japanese lemon and on the sour shaddock " Auger " were established.

* Formerly *Arch. Inst. Rech. agron. Indochine.*

3196. Colonial Development Corporation.
Report and Accounts, Colonial Development Corporation, for 1951, 1952, pp. 74, H.M. Stationery Office, London, 3s.

Of the 53 projects reviewed, 16 are agricultural, involving 27% of the capital so far sanctioned. Those of horticultural interest are: vegetable growing in the Bahamas; ramie, banana and cocoa in British Honduras; citrus, banana and coconut in Dominica; citrus processing and storage in Jamaica; oil palm and cocoa in Malaya; abaca in N. Borneo; ramie in Kenya; wattle in Tanganyika; and tobacco and tung in Nyasaland. Short summaries of the present position, programmes and prospects of each undertaking are given.

3197. Commonwealth Economic Committee.
Review of Commonwealth agriculture: production and trade.
Being *35th Rep. C.E.C.*, H.M. Stationery Office, London, 1952, pp. 201, 7s. 6d.

The 35th publication of the Commonwealth Economic Committee will be invaluable to the agricultural economist. Details are given for a period of years, often 10 or more, of the production and value of the main agricultural products in the following countries: The U.K., Canada, Australia, New Zealand, South Africa, India, Pakistan, Ceylon, S. Rhodesia, and the Colonial and Protected Territories. This is followed by reviews of agricultural production in general, prices and Commonwealth trade.

3198. Connecticut.
Proceedings of the 61st Annual Meeting of the Connecticut Pomological Society 1951, Hartford, Conn., 1952, pp. 133, illus.

Problems discussed at this meeting included: quality in apples as affected by pesticide and fertilizer sprays; efficiency in spraying, with special consideration of concentrates; hormones for thinning and drop control; leaf analyses for determining fertilizer needs in orchards; evaluation of methods of determining fertilizer needs; and strawberry diseases in England.

3199. Dansk Gartnerforening (Danvig, A. M., and Pedersen, K.).
Årbog for gartneri 1951. **(Horticultural Yearbook 1951.)**
S. L. Møllers Bogtrykkeri, Copenhagen, 1952, Vol. 33, pp. 219, Kr. 3.

Again, the first part of the book (pp. 3-112) contains much information on Danish horticulture in all its aspects [see *H.A.*, 19: 1670]. The manurial trials include several members' data of their experiments with glasshouse tomatoes which, among other results, show that yield and quality are determined by the same factors: namely the availability of a generous supply of K and N. Only in one case, where available P was very low, had P_2O_5 a significant effect. In 5 out of 6

trials with tulips it was found that organic manures—horn meal (2 trials) dried blood (2) and bone meal (1)—were superior to artificial fertilizers. In the case of horn meal and dried blood this was probably due to their N content and in the case of bone meal, which was applied to a soil low in P, the effect may be ascribed to the supply of P_2O_5. The biological aspects of the problem were not studied. In 3 experiments autumn, especially November, applications of N to tulips and narcissi gave better results than spring applications. Provided the bulbs were planted at the right depth for the type of soil in which they were grown, the position of the bulb had little influence on yield; hence, no objection can be raised to machine planting. In very light soils, however, or with bulbs planted too deep in a heavy soil the inverted position had an adverse effect. Reports of committees include detailed data on glasshouse paint, on the relation of glasshouse pipe diameter to heating capacity and price and on the results of astilbe and dahlia variety trials. Prøvedyrkning No. 122-125 (pp. 36) with reports on autumn and late cauliflower varieties and on lettuce varieties for hotbeds and cold frames conclude the Yearbook.

3200. D.S.I.R. London.
Food Investigation 1948, being *Report of the Food Investigation Board with the Report of the Director of Food Investigation for the year 1948,* 1949, pp. 27, H.M. Stationery Office, Lond., 9d. [received 1952; for report for 1949 see *H.A.*, 22: 1091.]

Among items of work mentioned as being in progress are: plant physiological studies on synthesis of ascorbic acid in germinating cress seeds and in stored potatoes; the production of ethylene and organic volatiles by apples and their effects; preservation of fruits and vegetables including frozen peas, storage of rose hips, gas-storage of bananas, concentrated orange juice, freeze-drying, concentration by freezing, quick-freezing, oil emulsion dips, storage and transport of lettuce, broccoli and plums.

3201. Directie van de Landbouw, The Hague.
Tuinbouwgids 1952. **(Horticultural guide to the Netherlands 1952.)**
The Hague, Holland, 1951, 9 × 6 in., pp. 693, illus., fl. 7.

This ninth volume of the Horticultural Guide follows the same lines as before, but the useful series of photographs illustrating pest and disease damage has been extended, and a glossary has been added of common horticultural terms in Dutch, French, German, English and Spanish.

3202. East Malling.
Annual Report of East Malling Research Station 1951, 1952, **A35**, pp. 204, 12s. 6d. and U.S.A. $2.00.

As formerly the report consists of 4 parts: I. The experimental farm with notes on crops and their yields, spraying programmes and experimental glasshouses. II. A general review of research work in each of the sections with lists of papers published during the year. III. Research reports and reviews on particular lines of work. IV. Bulletins for fruit growers. [Separate abstracts of the papers in III and IV appear in the appropriate sections of this number of *H.A.*]

3203. France, Ministère de l'Agriculture.
Travaux effectués en 1949 par les stations agronomiques. **(Work carried out by the agricultural stations in 1949.)**
Ann. agron. Sér. A, 1950, **1**: 529-661, bibl. 61.

In this review the work carried out by the agricultural stations in France on agricultural and horticultural crops is described under the headings: I. Climatological observations at Versailles. II. Lysimetrical observations. III. Reports on soil and manuring. IV. Plant nutrition. V. Experiments with manures (including a section on fruit trees). VI. Miscellaneous.

3204. Fungicide and Insecticide Research Co-ordination Service.
Annual Report F.I.R.C.S. for 1951.
Cunard Building, London, S.W.1, 1952, pp. 13.

In this report the functions of the F.I.R.C.S. are set out and the activities of the conferences, committees, and groups during the year are reviewed. There is little here of direct horticultural interest. A pea aphid control trial is mentioned and there is a note on the suitability of a sample dust as a potential diluent for DDT formulations.

3205. Hong Kong.
Annual Report by the Director of Agriculture, Fisheries and Forestry, Hong Kong, for 1950-51, pp. 72.

This is the first report of the newly formed Department of Agriculture, Fisheries and Forestry. A 20% increase during the year in the quantity of locally grown vegetables is recorded and orchard areas are estimated to have reached 150 acres. Experimental work at the agricultural stations included variety trials on many vegetable crops, and results with tomatoes, cauliflower and garden peas are given. The Gardens Department was incorporated in the new Department and its activities are summarized in Part V of this report.

3206. La Hulpe.
Rapport de la Station Provinciale des Recherches Scientifiques en Viticulture, No. 4. Résumé des essais pratiqués en 1949. (Report of La Hulpe Viticultural Research Station, No. 4. Summary of trials carried out in 1949), 1950, pp. 24, illus. [received 1952].

A biological study of the mite *Eotetranychus telarius* led to the conclusion that the first control treatment should be given when the adults emerge from hibernation, i.e. when half of the total number of vine buds have opened. A second spray should be given 8 days later. A mixture of 0·009 c.c. TEPP and 0·1 g. azobenzene per m^3 gave satisfactory control, and a mixture of azobenzene, E.605 and summer oil seemed promising. Trials to determine the effect of blossom sprays of various growth substances on the setting of Cannon Hall and Léopold III gave different results from those obtained in the previous year owing to the larger size of the spray droplets. Only 2,3,5-triiodobenzoic acid and orthochlorophenoxypropionic acid gave satisfactory results. A study of the effect of various types of growing medium on the root development of vines revealed the importance of constant moisture supply,

good aeration and an adequate supply of nutrients. The effect of a number of growth substances on the rooting of vine cuttings is reported.

3207. La Hulpe.
Rapport de la Station Provinciale des Recherches Scientifiques en Viticulture, No. 5. Résumés des essais pratiqués en 1950. **(Report of La Hulpe Viticultural Research Station, No. 5 Summary of trials carried out in 1950)** 1951, pp. 32, illus.

A survey was made of vine rootstocks used in the glasshouses of the Hoeilaart district, preliminary to long-term rootstock studies. Detailed observations on the performance of 9 rootstock varieties indicated, among other things, that white grape varieties used as stocks produce less vigorous growth and lower yields than black ones, and that the stock should be more vigorous than the scion. The best method of germinating pollen of glasshouse grapes on agar was studied, and it was found that the pollen of black varieties germinated best on a medium containing 5-15% sugar, while that of white varieties required 15-20% sugar. Experiments in the use of growth substances to stimulate the rooting of vine cuttings gave inconclusive results. In a study of the effect of soil texture on the development of young vine seedlings it was found that root development was best when the soil was mulched with a layer of fine peat 10-15 cm. deep. Trials on the use of growth substance blossom sprays to improve setting were continued. Further work was done on the biology of the mite *Eotetranychus telarius*. It is recommended that control sprays be applied 10-15 days after harvest and 10 days after bud break. Of the many fungicides tested for control of *Rhizopus*, none gave good control without damaging the plants.

3208. Indian Agricultural Research Institute, New Delhi.
Scientific Reports of the Indian Agricultural Research Institute for the year ended 30th June, 1949, 1951, pp. 205.

The first 78 pages of this report are devoted to a historical account of the development of the Institute since its foundation in 1905 and of research work carried out by it from 1905 to 1936 while it was situated at Pusa, from 1936 to 1945 when it was first situated at New Delhi, and from 1945 to 1948 after its reorganization. Another change from previous reports is that administrative and financial details are omitted. A summary of work in 1948/49 is followed by reports from the individual Divisions, including: *Botany:* Breeding and selection work was continued on potatoes, tomatoes, sesame and brassicas. Among a collection of 21 exotic and 29 indigenous sweet potatoes 2 from China and 3 from the U.S.A. have proved promising at Delhi. *Sugar cane:* A collection of 152 types consisting mainly of *S. spontaneum*, *Erianthus* spp. and *Sorghum halepense* was established. Breeding and cytogenetical studies are recorded. By adjusting photoperiod, irrigation and manurial treatments it was found possible to delay or hasten flowering in early and late varieties respectively. Comparison of the chemical composition of the flowering variety Co. 421 and the non-flowering Co. 468 showed differences to be small except for higher carbohydrate and a consistently higher C/N ratio in Co. 468. The presence or absence of starch in the stem would appear to be a specific character for certain species of *Saccharum*. In confirmation of previous results earlier maturity and better juice quality was obtained with 3 varieties grown on wet land compared with the same varieties grown on "garden" land. *Soil Science and Agricultural Chemistry:* Deficiencies of Mn, Zn, Cu and Fe have been found in citrus from several areas. A semi-micro method for the estimation of oils in seeds has been developed. *Entomology:* Various studies are reported on the *Trichogramma* egg parasite of sugar cane borers which is now being bred on a large scale. Fundamental research was undertaken into the action of DDT on insects. *Mycology:* Investigations were made on lentil wilt caused by *Fusarium orthoceras*, the resistance of sugar cane varieties to red rot and smut, late blight of potatoes, and virus diseases of tomatoes, potatoes, bottle-gourd (*Lagenaria leucantha*) and other plants. In each section of the report the programme of work for 1949/50 is summarized.

3209. Indian Coffee Board (Thomas, K. M.).
Third Annual Report of the Research Department of the Indian Coffee Board, 1949-50, being *Bull. Res. Dep. Indian Coffee Bd* 3, [1951 ?], pp. 51, R. 1.

The results of research carried out at Balehonnur and Chethalli are reported in detail. *Botany:* The breeding and selection programme has been revised. Yield records covering up to 13 years are tabulated for a number of Balehonnur arabica and robusta selections. Dry weather adversely affected the rooting of cuttings in open sand beds, and both under these conditions and under more favourable conditions in propagators the use of the hormone Seradix A in various concentrations had no effect on rooting. The coating of sucker cuttings with paraffin wax did not give encouraging results. *Chemistry:* In the long-term NPK trials nitrogen applications were increased from 20 to 40 lb. N per acre. Differences continued to be small and only in one or two cases were significant. Two trials involving NPK and organic manures and one involving the addition of catalysts showed no responses. Analyses are tabulated of N, P_2O_5, K_2O and C in the leaves of 8 shade trees. *Agronomy:* 4 methods of pruning failed to increase yields over unpruned controls. In a spraying and pruning trial over 11 years spraying has significantly increased yields, but pruning has had no effect. For young plants set in the field under unusually dry conditions shading with *Crotalaria anagyroides* caused much higher mortality than various forms of artificial shade. Seedlings in nursery beds transplanted better into basket pots 7 or 14 days after germination than when they were 21 days old. In a trial to prevent fruit drop Planofix and Phyomone were ineffective and Fernoxone and Methoxone significantly increased dropping at the concentrations used. Experience with several herbicides and with cover crops under established coffee is reported. *Plant protection:* Dithane D-14 failed to control leaf disease as well as did bordeaux mixture. 4-4-40 bordeaux proved better than 2-2-40, pre-monsoon and pre- and post-monsoon spraying combined was better than post-monsoon. The addition of Teepol X and Albolineum spreaders to bordeaux produced better leaf retention than bordeaux

alone in some cases but not others. Perenox equalled bordeaux in 2 years out of 3. BHC gave better control of stem-borer than DDT.

3210. Indian Tea Association, Tocklai.
Annual Report of the Indian Tea Association, Scientific Department, Tocklai Experimental Station, for 1950, 1951, pp. 39.

Manurial experiments: In trials on 3 estates where full manuring at the rate of N120, P40, K40 lb. per acre was begun again for the first time since 1943, N alone gave significant yield increases in 2 cases; the addition of P or K or both to N had no effect. In a comparison between cattle manure and inorganic NPK started in 1933 there was a slight difference in favour of the latter from 1933 to 1936, a significant difference in favour of the latter from 1937 to 1944 and little difference between the two from 1945-1949; in 1950, however, inorganic NPK gave a significantly higher yield than cattle manure. In 3 trials out of 4, comparing shade, N and plucking, 120 lb. N gave significantly higher yields than 40 lb. N in unshaded but not in shaded areas; the effects of shade were slight and variable; comparisons of tipping heights of 6 in. and 9 in. have so far shown only slight yield differences.
Biochemical Branch: Factory experiments: Investigations are reported on withering, rolling and the effects of sprays on quality. Among sprays lime sulphur, DDT and Perenox had no deleterious effects, but Gammexane [BHC] tainted tea badly for about 3 weeks after application. *Fundamental research:* Studies have continued on the mechanism of tea fermentation and on the chemical composition of tea-leaf. In studies on polyphenols 6 catechins have been identified as occurring naturally in tea and there are trace amounts of at least 17 other polyphenols as well as many anthoxanthins which vary considerably in different botanical types. The distribution of the polyphenols and of amino-acids in various parts of the shoot has also been studied; both have been found to vary considerably in stems and leaves. The concentration of amino-acids and unidentified substances resembling amino-acids that have been detected so far in fresh and withered leaf are tabulated.
Agric-Botany Branch: Nutrients and growth response: A count of the crystals of calcium oxalate in the phloem parenchyma cells of the tea leaf, designated the " phloem index ", has been shown to provide a measure of the response of the tea plant, in terms of yield, to changes in light intensity. *Agronomics and breeding:* It has been shown that the relative density of the hairy indumentum of the tea leaf is an index of quality and that deliberate breeding for hair results in a material improvement of quality. The existence of a graft-transmissible tea virus defined as leaf roll has been demonstrated. Seed size has been found to have a marked selective effect on phenotypes; quality of a plant population approximates to a parabolic (power) function of seed size whereas gross size of the plants is a linear function of seed size. Modifications of the shape of the plucking surface have proved not to be a factor of practical importance in respect of yield. *Plucking:* A 16-year-old experiment in which a low plucking horizon was adopted in each year in the early season and a higher horizon in the later season has shown that it is not possible, by alteration of the plucking horizon, permanently to maintain a yield that is above " normal " (e.g. the yield from a uniform horizon of 7-8 in.) for a particular season; in time early season yields decline, and late season yields increase, towards the normal. *Pruning:* Observations, parallel with the foregoing, have been made on the effect of 12 dates of pruning, annually repeated, the horizon of plucking being kept constant and optimum. If November pruning is taken as " normal ", any other time results in a gross annual loss relative to normal, but can increase yield above that which is normal for part of the year. The annual repetition of such pruning results in the maintenance of super-normal yield (during a particular season) for the period of years during which low plucking ceases to have an effect on yield. The operation " skiffing ", i.e. cutting back shoots to the normal level after letting them grow well above this following early season low plucking, markedly reduces the rate at which the early super-normal yield declines from year to year.
Plant Pathology Dept.: Entomology: Investigations are reported on the residual toxicity of acaricides, the effect of rain on their efficacy, their effect on control of red spider in the field and their effect on immature stages of the coccinellid predators of red spider. In trials against other pests DDT gave control of tea chest borers and a membracid attacking young albizzia shade trees, and DDT and gammexane reduced flea beetle attack on crotalaria. *Mycology:* Experiments are in progress on the control of red rust and on leaf injection for diagnosing mineral deficiencies. Blister blight is spreading and work has started on its possible control by systemic fungicides; so far the only systemic tested, 8-hydroxyquinoline, has proved ineffective. Soil injection trials against eelworm and spraying trials against disease of tea flowers are reported briefly.

3211. I.R.S.I.A., Belgium.
Comptes rendus de recherches No. 6. Travaux du Centre de Recherches des Hormones Végétales (1949-1950). **(Research report No. 6. The work of the Centre for Research on Plant Hormones, 1949-50),** Brussels, 1952, pp. 134, bibls, illus., 130 fr.

This account of the work of the centre for Research on Plant Hormones, Belgium, is one of a series of research reports published by the Institut pour l'Encouragement de la Recherche Scientifique dans l'Industrie et l'Agriculture. It consists of 4 papers on the action of 2,4-D and its derivatives as selective herbicides and 5 papers on role of growth substances in root formation and plant development. Most of these papers are abstracted separately.

3212. Kenya.
Annual Report of Kenya Department of Agriculture for 1950, Vol. I, 1952, pp. 38, 2s.

Part I of this report contains general information on weather, exports, crops and livestock. Part II summarizes the work of the Department. *Coffee:* There is evidence that the use of DDT to control *Antestia,* capsids and thrips may upset biological control. The use of copper sprays to prevent leaf fall has given inconclusive results so far as regards effects on yields. Maleic hydrazide produced some inhibition of growth

but did not appear to affect assimilation. Soil structure and nutrition studies have been continued; so far in a new trial mulching with Napier grass has given outstandingly beneficial results. Further enquiries confirmed that prolonged contact with water was liable to cause " onion " flavour in coffee and that BHC was probably responsible for " bricky " flavour. *Deciduous fruits at Molo:* For a note on advance précis of this section of the report see *H.A.*, 21: 3118. *Pyrethrum:* Breeding work was continued on 5 stations ranging from 6,500 to 9,000 ft., and selections have been made for bulk seed production. Investigations on bud disease, *Ramularia bellunensis*, and its control have continued, but without conclusive results. Stripping all open flowers at intervals of 2, 4 and 6 weeks compared with fortnightly selected picking resulted in a loss of pyrethrins which offset any saving in labour costs; in this trial, contrary to general experience, one clone showed little variation in pyrethrin content of the flowers between opening and maturity. Chemical investigations have been started into the cause of losses of pyrethrins in storage. *Sisal:* The old spacing and cutting trials continued to show that yield increases with plant population and that an early and light first cut is better than a heavy or delayed cutting. Preliminary results of a planting trial suggest that bulbils are better planting material than suckers and that shallow planting is better than deep. Bulbils in the nursery responded to a mulch of sisal waste and also to sulphate of ammonia and sisal waste compost. Trials suggest that high K may be needed to control banding disease, and that lime and superphosphate alone or combined reduce a type of leaf tip die-back. Several other experiments are in progress. In the Chemical Section a detailed investigation was made of the distribution of the major elements within the leaf and of the effect of the position of the leaf on the plant and of the age of the plant on this distribution.

3213. The Macaulay Institute for Soil Research.
Annual Report Macaulay Institute for Soil Research for 1950-51, Craigiebuckler, Aberdeen, pp. 56, illus.

The subjects on which work is in progress of particular interest to horticulturists include: Spectrochemistry, soil organic matter (peat, glasshouse, etc.), plant physiology (trace element interrelations, water culture, soft fruit nutrition, radioactive studies), soil fertility. With reference to the work on soft fruit nutrition experiments on raspberries and strawberries are designed to correlate leaf composition with treatment, growth and yield.

3214. Mauritius.
21st Annual Report of the Sugarcane Research Station, Mauritius, 1950, 1952, pp. 41, 75c.

Cane Breeding: Nine new varietal trials were started during the year including M.11/43, which had already given outstanding results. M.213/40 considerably surpassed M.134/32 in yield of cane and sugar, but has poorer juice qualities. The only Barbados variety to give better yields than M.134/32 was B.3337; B.37161 performed well as plant cane, grew fast and may yield valuable progenies when crossed with some of the Mauritian varieties. M.423/41 was released for general distribution and was in heavy demand. The source of planting material of M.134/32 was found to influence yields, but the percentage of total solids in the juice appeared unaffected. The routine factorial NPK experiments were continued by the *Chemistry Division* and again showed marked responses to N, and little or none to P and K. In the lime and magnesia trials only one in four showed a significant response, but the crushed basalt investigations continued to show the value of this material. *Botany Division:* Aretan, Abavit S and Agrosan GN gave good control of pineapple disease. Experiments on interplanting cane with food crops are reported. Among the secondary crops tested were potatoes and sweet potatoes. Weed control demonstrations formed an important part of the *Extension Service's* work.

3215. Maroc, Le Service de l'Horticulture. (Rapport général sur l'experimentation arboricole et maraîchère, depuis 1947.) **(General Report on Fruit and Vegetable Experimental Work since 1947.)**
Terre maroc., 1951, **25**: 407-13, 431-40, and 1952, **26**: 12-17, 61-8.

The Horticultural Service in Morocco is centred at Rabat and there are 10 regional stations listed here with notes on their climate, plant collections and experimental programmes. Experimental work completed or started since 1947 when the Service was established is summarized. *Tomatoes:* Three dates of sowing were compared using 6 varieties to obtain autumn-winter cropping and 3 dates were again compared using 4 varieties in an autumn-sown crop. An experiment to compare direct sowing with transplanting had to be abandoned, but it did suggest that direct sowing increased the risk of insect attack and that hormone treatment in transplanting had little effect. In another trial with 2 varieties (a third one failed) setting transplanted plants on their side with 5-6 cm. earth over their roots gave better results than setting the plants vertically, either with soil up to the collar or up to the first leaves. In a manurial trial on winter tomatoes with N, P and K each at 3 levels high N produced soft and watery fruits, and the best yield and firmest fruit were given by a mixture of high K and very high P. *Potatoes:* Several trials that have given inconclusive results are mentioned. *Green haricots:* A fertilizer trial suggested that high N tended to delay maturity, and the best yields came from small applications of NK and NP. In a spacing experiment on the variety Gloire de Deuil sowing in rows 50 and 60 cm. apart with single seeds 4-5 cm. apart gave higher yields than rows 30 or 75 cm. apart or than groups of 4-5 seeds set from 30×30 cm. to 75×75 cm. No difference was found for 3 varieties planted at depths of 2-5 cm. or of 10 cm. *Experimental work in progress:* Notes are given on 13 experiments in progress on citrus, 3 on olives, 4 on apricots, 3 on almonds, 3 on plums, 1 on peaches, 3 on vines and 1 each on apples, pears, quinces, and pecans, 15 on tomatoes, 7 on potatoes, 3 on haricots, 1 on peas, 2 on peppers, 1 on melons, 1 on watermelons, and 2 on onions. Several proposed experiments on fruits and vegetables are also mentioned. *Plant introductions:* Lists of plants introduced since 1947 include 46 varieties of citrus, 7 of peach, 18 of olive, 15 of fig, 8 of pomegranate, 10 of red currant, 7 of

gooseberry, 7 of black currant, 7 of raspberry, 6 of hybrid berries, 35 of tomato, 13 of haricot, 18 of pea, 14 of melon, 8 of watermelon, 8 of cucumber, 24 of pepper, 14 of sweet potato, 9 of lettuce and 9 species of cover crops.

3216. National Shade Tree Conference (Tilford, P. E., editor).
Combined Proceedings of 27th National Shade Tree Conference, Cincinnati, Ohio, and *18th Western Chapter National Shade Tree Conference,* Portland, Ore., 1951, pp. 306, illus.

Among the papers presented at these conferences the following are of special interest: *Foliage application of nutrients* (pp. 23-36). At New York Botanical Garden flowers and ornamental shrubs and trees sprayed with proprietary nutrient solutions responded well to the treatment. *The importance of chlorophyll for tree growth* (pp. 36-42). *Factors involved in injury by mist blower DDT formulations* (pp. 112-28). Injury to American elm is most frequently a result of extreme dosages. The most susceptible period for injury is from the time the leaf blade opens until it is fully expanded. Application just before dark appears to produce less injury than application during full daylight. The top side of the leaves is more resistant than the underside. *A programme for spraying insect pests of shade trees* (pp. 253-4). *Soil compaction, soil aeration and tree growth* (pp. 266-72).

3217. New South Wales.
Annual Report of the Department of Agriculture, N.S.W., for 1949-50, 1951, pp. 62, illus., 5s. 6d.

This highly condensed report covers the whole field of agriculture in the State and includes information on the following items of horticultural interest. *Division of Plant Industry: Tobacco:* In variety trials the most promising varieties were Hicks, U.S. 402, Yellow Special and Virginia Bright Leaf. Other work included fertilizer and irrigation trials and breeding for disease resistance. *Miscellaneous crops:* Plants under trial include castor oil, tung oil, cannas for fibre, hops and kudzu. *Potatoes:* Work included breeding and variety trials. Fertilizer and trace element trials against brown fleck were inconclusive owing to low incidence of the disorder. Spraying to kill haulms with 2% DNOC gave variable and in some cases undesirable results. Soaking Sequoia sets in 1% thiourea for 100 minutes in an attempt to increase the proportion of tubers of seed size adversely affected the germination of cut sets, retarded early growth but increased the number of stalks per plant; ultimate yields were slightly in favour of the treated sets. *Tomatoes:* Breeding and variety trials are reported. In a trial with Tatura Dwarf Globe, spaced 18, 24 and 30 in. apart the 18-in. spacing gave a significantly higher total yield than the 30 in., but there was no difference in size of tomatoes. β-naphthoxyacetic acid encouraged good cropping of the first fruit trusses. *Beans:* Breeding, time of sowing and trellising trials are reported. *Cauliflowers:* Recommendations for the control of whiptail with molybdenum have been widely adopted. A correlation was found between hollow stem and boron deficiency. *Cabbage:* An NPK trial promises to yield interesting results. *Peas:* 35 varieties were selected for further testing and the most promising introduced types are named. An NPK and method of application trial gave inconclusive results. In another fertilizer trial sulphate of ammonia depressed yields, dolomite increased yields and superphosphate increased yields but not significantly; molybdenum had no effect. In 2 trials sown in June-July for spring cropping a 2-in. depth proved better than a 4-in. depth of sowing. *Asparagus:* Using 3-year-old plants green asparagus yielded 7·45 cwt. of spears per acre compared with 5·33 cwt. for white asparagus; the former also needed fewer man-hours for harvesting; both gave the same percentage of marketable spears. An NPK trial is in progress. *Onions:* Attempts are being made to raise hybrids resistant to downy mildew. *Carrots:* Observations have been made on virus resistant varieties, and on internal colour and core size. *Other vegetables:* Breeding and variety trials are recorded on lettuces, rockmelons, watermelons and pumpkins. *Weeds:* Investigations have continued into methods of destroying blackberries with 2,4,5-T. Esters of 2,4-D and 2,4,5-T have given promising results against St. John's Wort. The ethyl ester of 2,4-D has given good results against Galvanized Burr. 2,4-D has also controlled convolvulus and wild gooseberry. Other herbicides are under trial. *Division of Horticulture: Citrus:* Three research stations are being established. Investigations are in progress on lemon storage and trifoliata rootstocks. *Bananas:* Yield records over 3 years with Cavendish are in favour of 9 ft. as compared with 11 ft. square spacing. DDT sprays have proved better than dusts in controlling rust thrips. The irrigation of hillside bananas has resulted in record yields. Investigations on salicylanilide and other mixtures used to control squirter disease showed that dipping mixtures remained effective for at least 3 weeks. Among perennial legume cover crops *Centrosema pubescens* is the most promising. Hormones are being tested for the destruction of bananas. *Passion fruit:* Studies on processing and freezing the pulp were continued. *Pome fruits:* The D.6 calleryana pear rootstock is still outstanding. In an apple rootstock trial varieties on Northern Spy are becoming relatively weaker compared with trees on seedling or E.M. stocks. Methoxone has proved an effective thinning agent when applied as late as the first cover spray. The effect of tree variability on storage keeping quality is being investigated for apples, as is the date of full blossom as a possible index for the date of picking. 2,4-D has been promising in preventing pre-harvest drop in Williams pears. Breeding of apples for pest and disease resistance has been continued. *Stone fruits:* Trials are in progress on canning peach varieties, prune cultivation, the use of intermediate stem pieces for J. H. Hale peach, peach thinning, rootstocks for plums, peaches and cherries, cherry cross-breds, cherry seed germination, and apricot breakdown. *Nuts:* Variety trials are in progress with almonds, walnuts, pecans and hazels. The propagation of walnuts and pecans is being studied. *Olives:* Conclusions have been drawn from variety trials, and several other studies are in progress. *Vines:* Trials indicate that Ohanez does better on phylloxera-resistant stocks than on its own roots. Hand pollination with Ohanez gave very good results. Spacing and cool storage trials are in progress. *Division of Science Services, Biological Branch: Plant*

Pathology: Studies are reported on the control of diseases of beans, potatoes, marrows, citrus, deciduous fruits, grapes, bananas and ornamentals. With citrus further evidence has been obtained that scalybutt of trifoliata stock is of virus origin. A " stunt bush " disease of grapefruit has been identified with the virus disease described in South Africa as " stem pitting ". *Entomological Branch:* Experience with new insecticides and equipment and on control measures adopted or tested against a wide range of fruit and vegetable pests is summarized. *Chemists' Branch:* There is evidence that decline and dieback of apple trees may be due to Mn toxicity. The oil content of a large number of olive varieties is being determined.

3218. Nova Scotia Fruit Growers' Association.
88th Annual Report of the Nova Scotia Fruit Growers' Association 1951, being Proceedings of the Convention held at Kentville, N.S., December 1951, pp. 190.

A wide range of problems was discussed at this meeting, including vegetable production, processing, storage and marketing; quality and quantity of apples as influenced by nutritional treatment; apple varieties old and new; hand and chemical thinning of apples; and pest and disease control. Several of the papers read are abstracted separately in their appropriate sections.

3219. Office de la Recherche Scientifique Outre-Mer (Combes, R.).
Exposé des activités pour les années 1948-1949-1950. **(An outline of activities for the years 1948, 1949 and 1950),** Paris, 1951, pp. 71, France 145 frs., Foreign 160 frs.

The Office de la Recherche scientifique Outre-mer (O.R.S.O.M.) is responsible for the " orientation, coordination, and control of scientific research in the French overseas territories ". Its Director, in his first report, describes how from 1945 onwards research institutes have been established in West Africa, Madagascar, French Equatorial Africa, the Cameroons, Togo, and the Pacific. Another Institute is being established in French Guiana, and assistance for various scientific activities has been provided in the French West Indies and Indo-China. An outline is given of the steps that led to the foundation of the various institutes, their buildings, equipment, staffing and research programmes, and of the complementary scientific services set up in France. In addition to agricultural research the Institutes are responsible for investigations in other sciences such as geology and anthropology.

3220. Oregon.
Oregon's agricultural progress through research, being *Annual Report of the Oregon Agricultural Experiment Station for 1950-51* or *Stat. Bull.* **508**, 1952, pp. 80, illus.

The following items are selected as of horticultural interest. *Potato diseases:* Vector control trials have shown that proper application of insecticides reduced the spread of leaf roll virus but failed to control mosaic virus. Of the chemicals tested parathion+DDT dust gave the greatest reduction in aphid populations. Treatment of cut potato seed-pieces with Phygon and Semesan Bel controlled decay and increased stand and yield. *Flowers:* A combination of complete fertilizer with lime produced scorch free foliage and good bud formation in Croft lilies. A new lily bulb grading machine, stated to be nearly eight times as fast as the old hand-grading method, is described and illustrated. *Vegetables*: Results of breeding, production and nutrition trials are presented. *Tree fruits*: It is shown that 2,4,5-T sprays accelerate the ripening of peaches, apples and pears, depending upon the variety of fruit, concentration and time of application. *Mulching:* Sawdust has been found a suitable mulch for blueberries, strawberries, ornamental trees and shrubs, vegetables such as cabbage and tomato, and nursery plants.

3221. Pennsylvania.
Science for the farmer, being *Suppl. No. 2, to the 64th A.R. Pa agric. Exp. Stat. for the year ending 30th June 1951*, 1952, pp. 11, illus.

This supplement includes an outline of the programme of potato breeding for immunity to blight and other diseases, and two spray schedules to control European red mites, Schoenei mites and two-spotted mites infesting Pennsylvania apple orchards.

3222. Queensland.
Fifty-first Annual Report of the Bureau of Sugar Experiment Stations for 1950-51, Brisbane, 1951, pp. 55.

A summary of this report appeared in the *Report of the Queensland Department of Agriculture and Stock for 1950-51* [see *H.A.*, 22: 2021]. In the present report work on sugar cane is described in detail. Among additional points from the Director's Report that may be referred to here are: Among cane varieties Q.28 is rapidly being replaced by Q.50; other leading varieties are Trojan, Badila and C.P. 29/116; the only new variety released is Q.56. Among green manure crops Reeves' Selection and Cristaudo cowpeas and velvet beans are now widely used in fallow periods. The use of herbicides has extended to the demonstration and commercial stages. Among diseases it would appear that downy mildew and gumming diseases have been eradicated and that the conquest of Fiji disease is in sight; particular attention is now being paid to pineapple, ratoon stunting and chlorotic streak diseases. The Director's Report is followed by reports on soil technology, 4 experiment stations, cane breeding, entomology and pathology, and mill technology. In the section on soil investigations reference is made to the persistence into second ratoons of the spectacular recovery in cane in the Mt. Pelion area which had been treated as plants with 56 lb. copper sulphate per acre. In the section on cane breeding it is mentioned that fuzz storage in " Pliofilm " bags proved highly successful; crosses made during 1951 are listed. [Work on pests has already been well covered in previous numbers of *Horticultural Abstracts.*]

3223. Rubber Research Scheme, Ceylon.
Report of the Work of the Rubber Research Board in 1950, Colombo, 1951, pp. 64.

Botanical Department: About 2,000 clones have been planted since 1941, and some 18 trials are mentioned briefly with records of growth or yield. Among them is a trial involving the test-tapping of clonal seedling families established from hand pollinations together

with 5 tree clones derived from these seedlings and planted simultaneously. In the replanting experiment started in 1936 both growth and yield of stumped buddings and budded stumps have evened out; field buddings being about 18 months behind in growth are still giving lower yields. In a rootstock trial planted in 1941 in which 5 RRIM clones were budded on seedlings of 6 clones there has been little evidence of stock-scion effects; of the scion varieties RRIM 501 has done best. Tree girths are recorded in a crown budding experiment in which 6 clones occupy all possible combinations of both intermediate stem and scion top. *Oidium research:* The common weed *Euphorbia pilulifera* was discovered to be a natural host of *O. heveae*. The mechanism of resistance in clone LCB. 870 was found to be related to quick maturation of the leaf cuticle. Other work on the disease included breeding for resistance based on LCB. 870, the use of this clone for crown budding higher yielding clones, the successful application of concentrated lime sulphur with a mist blower and studies on the life history of the fungus. *Soils Department:* In the 1938 NPK trial at Dartonfield P continued to give the best growth, but for the first time in six years failed to give a significant yield increase over other treatments. Two replanting experiments, one involving 2 levels of N and the other 4 methods of fertilizer placement showed no marked differences in response. No new work was undertaken by the Soils or Chemical Departments owing to lack of staff. *London Advisory Committee:* Various aspects of the French proposals [*H.A.*, 20: 2040] for marketing rubber classified by certain technological tests have been studied. The evidence indicates that, despite certain complexities, the French system should be of practical value to manufacturers. Investigations have also been made on the practicability of preparing in the East lignin and carbon black rubber masterbatches from latex, and on the standardization of procedure for carrying out the tests for latex adopted by the rubber trade.

3224. SEYCHELLES.
Annual Report of the Seychelles Department of Agriculture for 1950, [1951 ?], pp. 28.

Export figures are given for coconuts, cinnamon leaf oil and bark, and patchouli oil. The marked decline of the vanilla industry is indicated. Attempts are being made to distil a soluble cinnamon bark oil.

3225. SINDICATO NACIONAL DEL OLIVO.
XIII Congreso Internacional de Oleicultura, 1950, 3. Actas de Oleicultura, Vol. I, 6. Actas de Comercio, 7. Actas Economico-Sociales.
(13th International Congress of Olive Culture, 1950, 3. Olive culture Vol. I, 6. Trade, 7. Social economics), Madrid, pp. 540, 326 and 288 respectively.

These 3 volumes form part of a report on the proceedings of the Congress. Most of the papers contributed to the section " Olive culture " have been abstracted separately.

3226. SOCIETY OF CHEMICAL INDUSTRY (POLLARD, A. G., AND OTHERS).
Agriculture and horticulture.
Reps Progr. appl. Chem., 1949, London, **34**: 607-48, bibl. numerous [received 1952].

The following sections of this review of recent literature are of horticultural interest: *Crops:* (J. B. E. Patterson) pp. 620-6, bibl. 64. A set of 3 papers on husbandry, cultivation and disease control forms a valuable guide to potato growing in England. Progress is reported on recent fertilizer experiments on potatoes, work on the diagnosis of mineral deficiencies and the use of sprout inhibitors. Control of blight by destruction of the haulms is becoming more widely practised. *Horticulture* (O. Owen) pp. 626-31, bibl. 39. The increasing use and widening scope of plant growth regulators is commented on, new work on mineral nutrients is given and vitamin production in fruits and vegetables is surveyed. *Fungicides* (H. Martin) pp. 640-2, bibl. 14. *Control of plant nematodes* (B. G. Peters) pp. 642-5, bibl. 60. Different methods of DD application are discussed, its effectiveness is compared with other nematocides, and residual effects, phytoxicity and taint contamination are mentioned.

3227. SOCIETY OF CHEMICAL INDUSTRY (POLLARD, A. G., AND OTHERS).
Agriculture and horticulture.
Reps Progr. appl. Chem., 1950, London, **35**: 623-72, bibl. numerous [received 1952].

Among the subjects discussed in this review, which is becoming longer and more comprehensive than formerly, are the following of horticultural interest: *Fertilizers* (D. P. Hopkins) pp. 630-7, bibl. 32. The collated results of numerous field tests with peas at various centres are reported and an account of the Overseas Food Corporation's experiments with sunflowers is given. *Horticulture* (O. Owen) pp. 644-9, bibl. 39. The subject of this section is mineral nutrition, and among the points noted are spraying of foliage to supply major nutrients, correction of arsenic toxicity in peach trees by zinc applications, a case of copper deficiency in pear trees, the significance of the iron/manganese ratio, the effect of nitrogen and phosphorus on the transplantation of tomato seedlings, soil injection, the importance of potassium in citrus culture, the interrelationship of nutrients in oil palm, boron deficiency in fruit trees and the effect of fertilizers on ascorbic acid production. *Agricultural fungicides* (W. H. Read) pp. 655-62, bibl. 69. The more important results of fundamental investigations and practical trials are summarized, including work with organic sulphur compounds, glyoxalidines and pyrazoles, quinones, inorganic compounds, systemic fungicides and viricides, and antibiotics mainly on fruit trees and vegetables. *Control of plant nematodes* (B. G. Peters) pp. 662-5, bibl. 31. Mention is made of a number of systemic and other nematocides in connection with eelworm infestation of chrysanthemum and potato. The value of methyl bromide fumigation on onion seed and potato tubers and the hot water treatment for bulbs and cuttings is noted. Recent work on potato-root diffusates is recorded.

3228. ANDERSSEN, F. G. (UNION OF S. AFRICA, DIVISION OF HORTICULTURE).
Advisory, inspection and research work in horticulture.
Fmg S. Afr., 1951, **26**: 491-5.

The following research work is summarized in the report of the Division of Horticulture for 1950-51: *Citrus:* Results over 10 years in the long term Valencia orange manurial trial at Nelspruit have shown that

(i) P was the main limiting factor in the early stages; (ii) N and kraal manure affected yield since 1945; (iii) kraal manure alone at 150 lb. per tree per annum gave consistently higher yields than N or P alone; (iv) trees receiving no N showed a tendency towards decreased yields with an increase in age; (v) fruit size was increased by kraal manure and decreased by N, but was not affected by the age of the tree or size of crop; (vi) results of measurements for fruit quality in 1950 confirmed those obtained previously; (vii) although there were no significant differences in the incidence of " greening " attributable to fertilizers, there has been a tendency for P and kraal manure to increase, and K to decrease, the percentage " greening " per tree, and greened fruits contained ±15% more P_2O_5 and 20% less K_2O and 48% less invert sugars than normal fruits, and (viii) a marked decrease in the percentage " greening " per tree has occurred as the trees became older. In an irrigation experiment, for the first time since the trial was started in 1945, regular irrigation gave significantly higher yields than irrigation only during critical periods from July to January, while the latter gave significantly higher yields than watering only when the trees showed signs of 9 o'clock wilt; as in the past trees receiving the highest amounts of water produced the largest fruit; trees irrigated only in July-January produced significantly more out-of-season fruits than trees receiving regular irrigation, and the latter produced more out-of-season fruits than trees watered only when showing 9 o'clock wilt; records of quality made in the past were confirmed. In a cultural trial started at Alkmaar in 1947 clean cultivation throughout the year has produced significantly higher yields than two combinations of clean cultivation and cover cropping or than two permanent covers, one of which, a mown grass cover has given very low yields; the highest water requirement occurred in the permanent grass sod plots and the lowest in the plots where clean cultivation was combined with cover cropping; the most labour was needed on plots receiving clean cultivation in winter and a weed cover in summer and the least on plots established in the permanent legume *Glycine javanica*; the highest total N but the lowest available nitrate-N was found in the plots under permanent grass. Large scale variety collections have been established notably with avocadoes, mangoes, litchis, pecans, and bananas. Male tung trees, *Aleurites montana*, have been successfully topworked by the modified Forkert method. In a tomato fertilizer trial at Nelspruit rock-phosphate and superphosphate produced similar responses; in an earlier trial rock-phosphate had proved superior to super. Large numbers of vegetable varieties are under trial at Pretoria, and work on breeding and selection has been expanded. Tetraploid and a few triploid watermelons have been produced with the aid of colchicine. Breeding and selection work is in progress with pineapples. A new section devoted to flower culture has been started at the Pretoria Horticultural Research Station.

3229. Davel, H. B. (Union of S. Africa, Agricultural Research Institute, Pretoria).
Instruction and research in agricultural problems.
Fmg S. Afr., 1951, **26**: 496-502.

A section of this 1950-51 report is devoted to a summary of work on horticultural crops. The possibility of using mild strains of the stem-pitting virus to protect grapefruit against harmful strains is being studied. Nucellar citrus seedling selections are under investigation including two local selections, a blood orange and a Washington Navel, both of which show superior vigour to adjoining clonal material. A chlorosis thought to be due to Mn deficiency has been found in peaches, citrus and granadillas.

3230. Dyer, R. A. (Union of S. Africa, Division of Botany and Plant Pathology).
Plant classification and control of crop diseases.
Fmg S. Afr., 1951, **26**: 488-90.

The report of the Pathology Section for 1950-51 includes: *Citrus:* Good results with negligible spray damage have again been obtained in the control of die-back and root rot in oranges, lemons and grapefruit by spraying with urea at 25 lb., plus 10 lb. slaked lime, per 100 gal. water or at 12½ lb., without lime, per 100 gal. Timing was important as applications between January and June when the trees were comparatively dormant were ineffective. Studies on virus infection have shown rough lemon and Valencia and Washington Navel oranges to be very tolerant, but grapefruit to be sensitive; all parent material being used at present for propagation is infected. *Sub-tropical fruits:* Attempts to control with sulphur rotting caused by yeasts in packed litchis have been unsuccessful, and, in the absence of cold storage, the use of Pliofilm box liners seems to offer the best chance of control. *Sugar cane:* Smut has spread, Co. 301 being the variety most affected.

3231. Marais, J. S. (Union of S. Africa, Stellenbosch-Elsenburg College of Agriculture).
Farming problems in the winter-rainfall area.
Fmg S. Afr., 1951, **26**: 515-20.

This annual report for 1950-51 includes the following items of horticultural interest: *Entomology:* DDT dust at 5% and DDT spray at 0·1% applied to tomatoes gave good control of the cutworms *Euxoa segetis* and *E. subalba* and the caterpillar *Heliothis armigera*; toxaphene and chlordane were less effective. DDT was also the most effective material against the onion thrips, *Thrips tabaci*. *Viticulture and oenology:* The cultivation system in which the final ploughing is done as late as Oct.-Nov. and summer cultivation is reduced to a minimum continues to give good results. Clone selection is giving promising results. In a rootstock trial Shiraz grafted on Richter 99 yielded 34% more grapes than when grafted on Jacquez. Riesling, when trellised, outyielded Riesling, when untrellised, by 48%. As in the preceding year, fertilizer trials showed N to be the only fertilizer to increase wine-grape yields significantly. *Vegetables:* Variety trials were carried out with tomatoes, potatoes, bush beans, sugar beans, sweet potatoes and onions. In a potato trial spacing of 18×12 in. and the use of whole seed potatoes of 2 oz. gave the best results. In fertilizer trials on potatoes, carrots, beans and musk-melon on the Cape Flats the best results were obtained from 20 tons F.Y.M.+ 200 lb. ammonium sulphate and the worst from artificial fertilizers alone; deficiencies of Cu and Mn were corrected by the F.Y.M.

3232. Naude, T. J. (Union of S. Africa, Division of Entomology).
Entomological research in South Africa.
Fmg S. Afr., 1951, **26**: 503-10.

This report for 1950-51 includes notes on control experiments with several fruit pests. *Citrus:* Parathion has given good to fair control of citrus thrips (*Scirtothrips aurantii*), false codling moth (*Argyroploce leucotreta*), citrus mealybug, and red and mussel scales. For red scale timing is important, the best times being late autumn and spring. Dieldrin, Aldrin and Delan gave disappointing results against false codling moth. Parathion at 5 lb. per 100 gal. killed adult citrus red spiders (*Metatetranychus citri*), but not their eggs; a second spraying with an oil spray gave commercial control of the mites. *Peaches:* Parathion at 5 lb. 15% wettable powder per 100 gal. gave 93% kill of San José scale, *Aspidiotus perniciosus*. *Pineapples:* The nematode attacking pineapples has been identified as *Meliodogyne javanica*. A trial on the rejuvenation of worn-out pine lands by soil fumigation with D.D. has given promising results. *Gladiolus:* Spraying experiments are in progress on the control of gladiolus fly which is now also causing serious damage on carnations.

3233. Nel, R. I. (Union of S. Africa, Western Province Fruit Research Station, Stellenbosch).
The fruit industry in the winter-rainfall area.
Fmg S. Afr., 1951, **26**: 521-5.

Among the subjects summarized in this report for 1950-51 are the following: *Breeding and Selection:* Progress is reported on new varieties of peach, grape, guava, apricot, Japanese plum and pecan. Budwood has been made available to growers of 3 new canning peaches, Keimoes, Maluti and Tokani. The pecan varieties Nellis, Burkett, Halbert and Caspiana appear to be the best varieties for the area. *Delayed foliation:* Various hormones tested on peaches had no significant effect on delayed foliation. In a large-scale trial on peaches the sodium salt of DNC appeared to be more effective than other DNC compounds. With apples, pears and prunes the time of application and particularly the concentration of the spray have proved important when DNC is used in combination with a winter oil. *Guava propagation:* An improved method of layering guava shoots has been evolved. *Table grapes:* A comparison of 2 methods of thinning bunches gave different results with different varieties and with different bunches. In a summer-pruning experiment on Waltham Cross all forms of tipping, except those where only the shoot tips, but no leaves, were removed, markedly reduced both yield and quality. Decreased wastage and improved appearance resulted from packing 5 lb. of grapes in paper bags, 3 of which were placed side by side in an ordinary half lug box. Fertilizer trials on Waltham Cross and Barlinka, now in their 13th year, have shown that even on a fairly fertile alluvial soil 800 lb. sulphate of ammonia, 600 lb. P_2O_5 and 600 lb. K is needed per morgen to maintain a production of about 3,000 12 lb. boxes. *Cultivation practices:* A 3-in. straw mulch kept continuously around plum trees on medium heavy soil caused severe injury to the trees. A lupin mulch formed by cutting down a cover crop and ploughing to 24 in. improved yield and quality in Kakamas peaches. *Diseases:* Spray trials with various fungicides failed to reduce the freckle disease of apricot fruits, though a cotton-seed oil emulsion and a lime-bentonite mixture reduced the extent of the blemish, which is now thought to be of a physiological nature. The plum stock, Marianna, would appear to be a symptomless carrier of infectious chlorosis. The synthetic sprays thiram and zineb have again given satisfactory control of pear scab. *Insect pests:* In a comparison of poison baits used to control the Argentine ant (*Iridomyrmex humilis*) one containing honey proved more attractive than others containing commercial syrup or boiled sugar syrup. *Cold storage:* Early season Navel oranges have again proved less liable to cold injury than late season Navels, but with Valencias the position was reversed. Storage tests are in progress with deciduous fruits, pineapples, avocadoes and tomatoes. *Physiology:* Juiciness in apples was found to be related to the rate of respiration; maximum juiciness was attained during the pre-climacteric, more or less at the stage when the fruit should be picked for storage. *Other investigations* included rootstock trials on pome and stone fruits, root-distribution studies in citrus, studies on trace-element nutrition, studies on diseases and pests, trials with 2,4,5-T on the ripening and storage of apples, and food technological investigations including methods of dehydrating pineapples, peaches, beans, mint and hops.

3234. Neveling, C. H. (Union of South Africa, Secretary for Agriculture).
Balanced production in agriculture. *Report of the Department of Agriculture for the year ended 31 August 1951.*
Fmg S. Afr., 1951, **26**: 395-431, 448.

The report of the Secretary for Agriculture includes summaries of production and consumption of oil seed crops, potatoes, chicory, tobacco, deciduous fruits, dried fruits, citrus and other sub-tropical fruits and viticultural products. The rest of this number of *Farming in South Africa* consists of Divisional Reports, some of which are abstracted separately [see abstracts above and below].

3235. Saunders, A. R. (Union of S. Africa, Natal Agricultural Research Institute).
Agricultural research in Natal.
Fmg S. Afr., 1951, **26**: 511-14, 528.

Among other items this 1950-51 report contains brief mention of a farm management and cost of production survey of sugar cane, a collection of about 170 fruit varieties at Ukulinga, small scale trials on the spacing of carrots, and on hormone and calcium carbide treatments to induce out-of-season flowering in pineapples, and investigations on the etiology of a leaf spot disease of *Phlox drummondii* and on the so-called " black " and " brown spot " of pineapple fruits.

3236. Turpin, H. W. (Union of S. Africa, Agricultural Education and Research).
Research and education in agriculture.
Fmg S. Afr., 1951, **26**: 469-87.

The report of the Director of Agricultural Research and Education, South Africa, includes the following items of horticultural interest: *Central Tobacco Research Station, Rustenburg* (p. 478): An experiment has shown that tobacco need not be sown before July, and that Oct.-Nov. was the best period for transplanting.

Closer spacing increased yields in both Orinoco and Amarelo types. The variety 219–2–3 outyielded Bonanza and yellow Mammoth. Increasing N from 0 to 72 lb. per morgen in association with P and K significantly increased yields and returns of Orinoco tobacco grown on black turf soil; increasing K improved quality provided applications in chloride form did not exceed 200 lb. per morgen. With balanced nutrition and correct spacing, regular topping and sucker suppression increased the value of flue-cured tobacco by £30 per morgen. Rotation trials have shown that tobacco should not be grown more often than once in 3 years on the same soil. Sixty-seven per cent of radioactive superphosphate applied to noritic turf soil was absorbed by tobacco during the first 4 weeks; thereafter the proportion of applied phosphate absorbed declined. K deficiency has been found to cause certain physiological diseases. Eelworm was controlled effectively in seed beds and the field by D.D. and Dowfume W40. Steam sterilization of seedbeds proved an effective method of controlling mosaic. Regular spraying with Arathane W.P.25 controlled white rust (mildew). *Vaal-hartz Agricultural Research Station:* Variety trials are reported on peas and dwarf and runner beans and manurial trials on carrots, beetroot, peas and onions. With grapes the varieties Gobernador and Alphonse Lavalle yielded better on their own roots than when grown on other rootstocks, but Sultanas yielded more on Jacques stocks than on their own roots.

3237. SUDAN.
Annual Report of the Research Division, Ministry of Agriculture, Sudan 1948-1949, 1951, pp. 194, map.

This report, the first to be issued since 1937/38, is almost entirely devoted to cotton, but it includes accounts of work on weed control and on safflower. Treatment of canals with the sodium salts of methoxone and chloroxone to provide a concentration of 8 p.p.m. in the water, though giving some control of water weeds [types not specified], was less effective than in the preceding year; spraying with copper sulphate to provide a concentration of 20 p.p.m. in the water destroyed the alga *Chara fragilis* but with 10 p.p.m. new growth occurred. With the safflower variety Shambat sown in rows 36 in. apart thinning to 12 plants per metre gave slightly better yields than wider spacing of 8 or 4 plants/m., but differences were not significant.

3238. TANGANYIKA.
Sixteenth Annual Report of the Coffee Research and Experimental Station, Lyamungu, Moshi, 1949, 1951, pp. 67.

No final decision can yet be reached on the question of whether clones are superior to seedlings in yield or bean characters; contrary yield results have been obtained in two experiments and the beans have shown no real differences. Similarly, conflicting results have been obtained in different experiments regarding the effect of mulches on yield. Irrigation increased yields significantly, but rates in excess of 2 in. per month gave no additional increase. In general, mulches, with or without compost or nitrogen, do not counteract biennial bearing, but the same tendency to biennial bearing is not shown under irrigation despite the bigger crops obtained, showing that, under the conditions at this Station, soil moisture has been a limiting factor to annual cropping. Whilst in 1949 the single stem pruning system outyielded the multiple stem, over the 12 years' period the latter system has given a much higher yield, a mean of 9·9 cwt. clean coffee per acre against 6·9 cwt. Liquoring tests in 1949 of coffee from plots planted each year in the 1937-44 period showed no more than half a class difference, thus not confirming the pre-war opinion in some quarters that young trees give coffee of a higher liquoring standard. For propagation by cuttings, the internodal position of the basal cut, with splitting the stem up to the node above, has proved better than the nodal position cut, both for percentage rooting and for speed of rooting. A.C.S.

3239. TRINIDAD AND TOBAGO.
Administration Report of the Director of Agriculture, Trinidad and Tobago, for 1949, 1951, pp. 31, 48c.

This report includes details of crop exports and notes on the work of the Department, among which are the following: *Cacao:* At La Pastoria Propagating Station the " open bin " continuous daytime fog spray method of rooting cuttings has proved both efficient and economical. Both species of Immortelle, *Erythrina* spp., have been affected by disease in epidemic proportions, the lowland type by a fungus, *Calostibe* sp., and the highland by a disease presumed to be a virus. *Sugar cane:* In addition to DDT and BHC dusts now in common use against froghopper, DNC and chlordane have given promising results. *Citrus:* In the rootstock trials at St. Augustine sour orange and its variety, Seville Sweet, have proved more suitable than rough lemon or wild grapefruit as regards yield, resistance to gummosis and stock-scion compatibility. *Coconuts:* In trials on estates poor bearers have again shown significant responses to N, but trees that normally bear well have not responded.

3240. TUNISIE, SERVICE BOTANIQUE ET AGRONOMIQUE.
Rapport sur les travaux de recherche effectués en 1950. **(Report on research in 1950.)**
Ann. Serv. bot. agron. Tunis., 1949 [issued 1951], **22**, *Suppl.* pp. 80, illus.

The items of chief horticultural interest are included in the reports from the Laboratory of Marketgarden crops (pp. 33-6), and from the Laboratory of Fruit-trees (pp. 55-60). The former contains notes on the introduction of early varieties of tomatoes, selection of tobacco varieties, and the introduction of various varieties of vegetables; the latter includes mention of the constitution and maintenance of the pomological collections, with notes on introduced varieties of apricot, almond, peach, apple, and plum, hybridization of apricot, vegetative reproduction of pistachio, research on almond rootstocks resistant to eelworm, and drying apricots.

3241. U.S. AGRICULTURAL RESEARCH ADMINISTRATION (CARDON, P. V.).
Report of the Administrator of Agricultural Research, 1950, 1951, pp. 488, $1.00.

Following a brief introduction in which the aims and achievements of research, including those relating to Alaska and to strategic materials, are outlined,

detailed reports are given by the heads of the various Bureaux responsible for all aspects of agricultural research in the U.S.A. [Abstracts 3242 and 3243 deal with two of them, and for a third see *H.A.*, 21: 4110.]

3242. HILBERT, G. E.
Report of the Chief of the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, 1950.
Rep. Administ. agric. Res., U.S. Dep. Agric., 1950, 1951, pp. 11-125, also issued as Separate, pp. 111, 30c.

The many research projects reported include: the successful hulling of tung fruits in the field; the discovery of limitations to the specific-gravity grading of potatoes; the development of permanent colour standards for maple syrup; the discovery of several unidentified alkaloids in cigar-leaf tobacco; a new process for recovering nicotine from green *Nicotiana rustica* plants; the development of 3 methods of preparing frozen apple-juice concentrate, new equipment for flash-sterilization of juices, and methods of making frozen grapefruit concentrates and other citrus products; the canning and pasteurization of dates; the production of powders from dried prunes and figs, and of new food products from fresh prunes; an improved wax treatment to retard mould growths in berry picking boxes; the development of canaigre as a source of tannin, and investigations into other possible sources including sumac, hemlock bark, oak bark, chinguapin and saw palmetto (*Serenoa repens*); new methods of extracting rubber from guayule; an investigation on possible plant sources of cortisone and ACTH; studies on various antibiotics from grapefruit peel, bananas, sweetpotato stems, and cabbage, and on medicinal uses for the alkaloids tomatine and tomatadine from tomatoes; the discovery of new natural plant-growth regulators; studies on the action on bean plants of carbamic acid esters of 4-dimethylamino thymol and 4-dimethylamino carvacrol methiodides; and studies on the effect of plant-growth regulators on plant enzyme systems. New apparatus developed includes an automatic multiple-extraction apparatus and a special paper-partition chromatographic apparatus. The balanced incomplete block design has been applied to make the measurement of food-quality differences by taste panels more accurate.

3243. HOYT, A. S.
Report of the Chief of the Bureau of Entomology and Plant Quarantine.
Rep. Administ. agric. Res., U.S. Dep. Agric., 1950, 1951, pp. 259-330.

The following among investigations affecting horticultural crops may be noted briefly: *Fruit and nut insects:* Progress on oriental fruit fly research; the effect of parathion in controlling purple scale and advancing maturity in oranges; the vapour-heat sterilization of citrus fruits to kill Mexican fruit fly; developments in apple spray programmes; the evaluation of summer sprays for mite control; the control of pear psylla with parathion, of cherry leaf miner with BHC and chlordane, of pecan weevil with toxaphene and of pecan twig girdler with DDT and parathion. *Vegetable and flower insects:* an improved greenhouse aerosol; studies on the curly-top virus of beans and cantaloupes and control of its leafhopper vectors; the development of a lightweight mist blower for use on vegetables; investigations on the control of sweet potato weevil, cabbage caterpillars, potato aphids, narcissus bulb fly, pea weevil, pickleworm and melonworm, seedcorn maggot on sprouting beans, and tomato fruitworm; and studies on the golden nematode and potato root nematode. *Insecticides:* A new insecticidal material found in the roots, stems and leaves of *Heliopsis scabra*; the commercial production of allethrin; studies on octamethyl pyrophosphoramide as a promising systemic poison against mites and aphids and on insecticidal plant alkaloids from *Tripterygium wilfordii* and *Nicotiana glauca*; the use of cholinesterase inhibition to measure organic phosphorus spray residues; and the development of protective equipment for use in handling parathion. *Control of plant diseases:* Improved formulations of 2,4-D and 2,4,5-T for the eradication of *Ribes* spp., the alternate hosts of the white pine blister rust, and of barberry, the alternate host of stem rust of cereals; studies on virus diseases of peach and strawberry and their vectors; and surveys on citrus canker and camellia flower blight.

3244. U.S. DEPARTMENT OF AGRICULTURE (TRULLINGER, R. W.).
Report on the Agricultural Experiment Stations 1950, 1951, pp. 214.

In this report the more important research projects of the Federal Stations are summarized. *Breeding:* of potatoes, sweet potatoes, tobacco, tree and soft fruits, nuts, vegetables and ornamentals. *Fruits:* The effects of mulching and of various types of pruning are noted. Application of a water spray of 2,4-D to nearly mature citrus decreased drop and extended the profitable harvest season of oranges, lemons and grapefruit in California. In spraying trials in Delaware SR406 reduced the incidence of brown rot in peaches to approximately 1%. Virus diseases of stone fruits are being closely investigated at a number of stations, and citrus diseases are receiving particular attention in California. The Puerto Rico station discovered the insect carrier of the southern coast papaya mosaic virus, *Aphis spiraecola*, and developed methods for its control. Diseases of small fruits and their control are noted. Advances in insect control are reported. *Vegetables:* In Delaware with asparagus and in Arkansas with tomatoes a 1–1–1 fertilizer ratio was found the most productive. By combining leaf pruning of staked tomatoes with a spray of *p*-chlorophenoxyacetic acid on the flowers after 3 to 5 flowers had been pollinated, tomato yields were increased by 50% in Missouri. *Ornamentals:* In Illinois it was found that defoliation did not promote increased flowering of greenhouse roses.

3245. WYOMING.
61st Annual Report of the Wyoming Agricultural Experiment Station for 1950-51, Laramie, pp. 48, illus.

Notes are included on potato variety trials; breeding red-skinned, ring-rot and scab-resistant potatoes; and the use of antibiotics for bean blight control. Shale-oil used as a herbicide was found to be a powerful stimulant to bean plants.

New or revived periodicals.

3246. FACULTY OF AGRICULTURE, TOHOKU UNIVERSITY, SENDAI, JAPAN.
The Tohoku Journal of Agricultural Research, 1950, Vol. 1, Nos. 1 and 2, pp. 232.

Although the first two numbers of this new periodical received in this office contain nothing of direct horticultural interest we wish to bring it to the attention of our readers as a scientific journal which is clearly of a high standard. The papers are on original work and so far are presented in 4 sections, agronomy, animal husbandry, fisheries and agricultural chemistry. All are written in good English.

3247. INTERAMERICAN INSTITUTE OF AGRICULTURAL SCIENCES, TURRIALBA, COSTA RICA.
Turrialba, Revista Interamericana de Ciencias Agrícolas, 1950, Vol. I, No. 1, pp. 65, illus., $2 per annum.

This new quarterly journal publishes original papers on the agricultural sciences and rural life in Latin America. Crop production, animal husbandry and soils are covered. The papers are in Spanish or English, the Spanish research papers having English abstracts. In addition to research papers and technical notes, each number has a section devoted to classified abstracts, compiled from world literature, of interest to South American agricultural scientists.

3248. THE KAGAWA AGRICULTURAL COLLEGE.
Technical Bulletin of the Kagawa-Ken Agricultural College, 1949, Vol. 1, No. 1, pp. 60.

It would appear to be the intention to issue 1 volume of this journal consisting of 3 numbers each year. The papers describe original work on a wide field of agricultural sciences, and each number seen so far contains matter of horticultural interest. The text is in Japanese, but each paper contains an English summary which is generally quite adequate as to fullness though not always as regards clarity.

3249. MINISTÈRE DE L'AGRICULTURE, RÉPUBLIQUE FRANÇAISE.
Annales de l'Institut National de la Recherche Agronomique, Série B. Annales de l'Amélioration des Plantes, Dunod,* Paris, 1951, Vol. I, No. 1, pp. 154, fr. 500.

This is the first journal in the French language entirely devoted to plant genetics. It will primarily publish papers on work carried out at the laboratories, or under the auspices, of the Institut National de la Recherche Agronomique and print abstracts of papers in the same field. Publication is to be quarterly.

3250. MINISTRY OF AGRICULTURE AND FISHERIES, PLANT PATHOLOGY LABORATORY, HARPENDEN, HERTS.
Plant Pathology.
1952, Vol. 1, No. 1, pp. 34, published quarterly by H.M. Stationary Office, London, 16s. 6d. per annum including postage.

Dr. W. C. Moore in an introduction states that " the periodical *Plant Pathology*, like the science from which it takes its name, will be wide in its scope. It will contain original contributions on plant diseases caused by fungi, bacteria, viruses and eelworms; on plant pests, including those of stored products; on damage by rodents and birds; and on nutritional and physiological disorders. It is intended primarily for the prompt publication of information on the incidence, distribution, recognition and control of plant diseases and pests in Britain. It will record survey work, including estimates of crop losses, and contain much matter of topical interest on preliminary experiments and their provisional interpretation, on forecasts, and on precautionary measures." The first number includes papers on trials of substitutes for sulphuric acid for potato haulm killing, the identification of aphids of economic importance, the principles underlying plant import and export regulations, rabbit repellents for fruit trees, and the tortrix *Cnephasia longana* on fruit trees in Essex. The form of the articles and their arrangement is very similar to that employed in the Ministry's journal *Agriculture*. The only criticism that might be offered is that the papers are not accompanied by a synopsis or summary.

* Now issued by Institut National . . . 7 rue Keppler, Paris, ann. sub. fr. 2,700

3251. VEREINIGUNG FÜR ANGEWANDTE BOTANIK.
Angewandte Botanik, 1951, Vol. 26, No. 1, pp. 54, Vereinig. f. Angewandte Botanik, Berlin-Dahlem, DM. 6.

After an interruption of 6 years the first number of this valuable journal appeared again in September 1951. Publication, which is to be irregular for the time being, has been made possible by the revival of the Association of Applied Botany in Western Germany and Berlin.

Noted.

3252.

a KNOWLES, W. H. C.
Report on the sugar experiment stations for the year 1950.
Sugar Bull. Brit. Guiana Dep. Agric. **19**, 1951, pp. 49-54.
For report on field experiments see abstracts 3101, 3120.

b MINNESOTA.
57th A.R. Minnesota agric. Exp. Stat. 1949-50, St. Paul, pp. 36.

c SIERRA LEONE.
A.R. Sierra Leone Dep. Agric. for 1949, 1951, pp. 43.

d SINGAPORE (HENDERSON, M. R.).
A.R. Botanic Gardens Department, Singapore, for 1950, 1951, pp. 6, illus., 50 cents.

e UGANDA.
A.R. Uganda Department of Agriculture for 1950, 1951, pp. 48, 3s.

f VIRGINIA.
Proc. jt Mtg Virginia St. hort. Soc. 56th annu. Mtg and Amer. Pomol. Soc. 66th Mtg, Roanoke, Va, 1952, being *Virginia Fruit*, Vol. **40**, No. 2, pp. 138.

g WYOMING.
51st, 52nd, 53rd, 54th and 55th Annual Reports of the Wyoming Agricultural Experiment Station for 1940-41, 1941-42, 1942-43, 1943-44 and 1944-45, Laramie, pp. 47, 60, 50, 47 and 46 respectively [received 1952].

N.B.—The cumulative subject and author index to Volumes XVI-XX, greatly facilitating the use of those volumes, has just been issued and is now available, price 50s. or $7.
This Erratum Slip is issued as a stimulus to those who wish to buy copies of the index before it is exhausted and for the information of others.

HORTICULTURAL ABSTRACTS

Errata, Volumes XVI—XX, 1946-1950

N.B.—These do not include errors in the individual yearly indexes, which are now superseded by the 5-year index.

Volume XVI

Abstract

301 Title. Line 3 and line 1 of abstract. For *ascetella* read *assectella*
356 Author. *For* Wellensick, S. J. *read* Wellensiek, S. J.
416 Author. *For* Cameron, S. N. *read* Cameron, S. H.
836 Line 3. *For* Agrozone *read* Agroxone
1126 Title and Line 1. For *Cinnamonum* read *Cinnamomum*
1192c Title. Line 2. *For* plaintain *read* plantain
1206 Line 4. *For* the flowers *read* hydrangea flowers
1896 Lines 3 and 4 should read: by *Pseudomonas mors prunorum*, but branch or stem cankers are absent. However, the
1957 Line 6. *For* 200 cwt. *read* 2 cwt.

Volume XVII

167 Line 2. For *termifera* read *terminifera*
271 Last line. For *aroidea* read *aroideae*
310 Title. Line 5. For *Lantbr.* read *Kungl. Lantbr.*
408 Author. *For* Portières *read* Portères
512 Title. Line 1. *For* TWENTY-SEVENTH *read* TWENTY-NINTH
547 Author. *For* Anderson, W. H. *read* Anderson, H. W.
571 Author. *For* Martin, L. E. R. *read* Martin, L. R. E.
705 Penultimate line. *For* HCN *read* HCH
800 Author. *For* Vaughan, J. R. *read* Vaughn, J. R.
1081 Title. Line 4. *For* 309 *read* 809
1246 Author. *For* Sianes, F. *read* Siaens, F.
1449 Title. Line 1 and line 1 of abstract. *For* canker *read* wart disease
1585 Author. *For* Malott, J. C. *read* Maloit, J. C.
1651 Author. *For* Loucks, F. W. *read* Loucks, K. W.
1841 Title. Line 1. *For* paeonia *read* Paeonia
1879 Line 1. For *transchetii* read *franschetii*
1907g Penultimate line. *For* **66:** *read* pp.
2134 Penultimate line. For *Criocerus* read *Crioceris*
2239 Title. *For* Schroeder, R. H. *read* Schroeder, R. A.
2760 l Last line. *For* **66:** *read* pp.
2776 Line 20. For *Cinnamonum* read *Cinnamomum*

Volume XVIII

619 Line 4. For *Anopelepis* read *Anoplolepis*
1296 Line 3. *For* 100 *read* 1,000
1354 Line 8. For *Anaplolepis* read *Anoplolepis*

Volume XIX

660 Author. *For* Bovey *read* Bovay
679g Author. *For* Glendenning *read* Clendenning
888 Author. *For* Kramer *read* Kremer
900 Title. Line 5. For *Ann. agric.* read *Ann. agron.*

Abstract

905 *For present abstract substitute*—
Analyses made by workers of the Pennsylvania Agricultural Experiment Station indicate that peach leaves taken from terminal growth show the highest degree of correlation between leaf K and K application. Further, leaves from the basal part of the current season's wood are most suitable for estimating the level of K available to the trees.
924 Author. *For* Schultz *read* Schulz
965 Author. *For* Balckmon *read* Blackmon
1205 Title. *For* 381 *read* 391
1894e Title. Line 3. *For* **50:** 6: 9-10 *read* **50:** 5: 9-10
2460 Line 3. *For* 1936 *read* 1536
2590 Line 20. *For* soil-inhibiting *read* soil-inhabiting
2731 Title. Line 3. *For* **50:** 7: 7 *read* **50:** 6: 7
2735 Line 2. *For* 1919 *read* 1949
2753 Author. *For* Scheng *read* Schenk
2808n Title. Line 3. *For* **50:** 8: 24 *read* **50:** 7: 24
2979 Line 8. *For* insecticide *read* fungicide
3327 Title. Line 3. *For* **91** *read* **90**
3364 Penultimate line. *For* thus stored *read* stored with buttons
3390b Author. *For* Bradbent *read* Broadbent
3522 Penultimate line. *For* date *read* print
3566 Title. Line 4. *For* 1949 *read* 1948
2880 3099 and 3173. Titles. *For* 1948 *read* 1948 (issued 1949)

Volume XX

63 Line 3. *For* 19: 1791, 1795, 1976 *read* 19: 107, 1791, 1796, 1797
143 Line 4. *Omit* and *S. squamosus*
201 Author. *For* Stoddard, L. A. *read* Stoddart, L. A.
473 Line 6. *For* infection *read* injection
560 Title. Line 4. For *Rev. romande Agric. Vitic.* read *Rev. hort. suisse*
637 Author. *For* de Ferrière, J. F. *read* Franc de Ferrière, J.
979 Title. Line 4. *For* 1950 *read* 1949
1110 Title. Line 3. For *Bull. Jamaica Dep. Sci. Agric.* read *Bull. Barbados Dep. Sci. Agric.*
1394 Line 3. *For* 1 c.c. *read* 0·1 c.c.
1445 Author. *For* Makarov-Kožuhov, L. H. *read* Makarov-Kožuhov, L. N.
1783 Title. Line 4. *For* 187-92 *read* 129-70, bibl. 5.
2248 Author. *For* von Denfer, D. *read* von Denffer, D.
2447 Author. *For* de Ferrière, P. J. J. F. *read* Franc de Ferrière, P. J. J.
2488 Author. *For* Dominion Forest Service *read* Manitoba Forest Service
Title. Line 4. For (*Publ.*) *Dominion Forest Serv.* read (*Publ.*) *Manitoba Forest Serv.*
2516 Line 4. For *erybotriae* read *eriobotryae*
3053g Last line. *For* **3** *read* **53**
827, 855, 877 and 878. Titles. *For* 1948 *read* 1948 (issued 1949)